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PiX-Elation

THE OFFICIAL NEWSLETTER
OF THE VIRTUAL REALITY ALLIANCE
OF STUDENTS AND PROFESSIONALS



**Special Virtual Reality
Entertainment Issue!**

Let Us Edutain You

In case you haven't looked up from your monitor lately, allow us to inform you that the wall is officially tumblin' down. In recent months the general public has been bombarded with phrases like **Virtual Reality** and **Cyberspace**. TIME's "Cyber" issue dislodged a large brick (one which some Cybernauts would have preferred to have kept securely in place), and other publications are following their lead. Arcades tout "interactive," "immersive," and "virtual" experiences. TV news magazines scramble through the rubble for buzzwords and graphics, and kids' commercials are now tossing VR concepts about flagrantly, yet somehow public **misunderstanding** still seems just as prevalent as before. It seems that some of the fundamental concepts are just not getting across.

"Virtual Reality" is not an end in itself, but a means — perhaps the best ever devised — to any end imaginable. The problem of explaining VR to an interested layman is a thorny one, for despite its inherent complexity and intimidating breadth of application, it is still a nascent and unsure industry; one which yet requires much development, understanding, and time. Few VRASPIans would disagree that the public sorely lacks practical information in this area. Many writers have attempted in various ways to explain VR to society as a whole, and yet the immensity of the subject makes it difficult to "grok in its fullness."

As with any science, the virtues of VR can be determined only after its application, and only in the context of the uses to which it is applied. And, as with any artform, VR can only be truly understood via direct, subjective experience. Simply put, the question becomes: **How do you teach something which is so new, so different from a person's experience and expectations?**

The Play's the Thing

The answer? **Entertainment**. Educators have long told us that comprehension and retention increase exponentially when learning environments include elements of play. Psychologists have shown that a

VRASP

The Virtual Reality Alliance of Students and Professionals
p r e s e n t s

PIX - ELATION

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good degree of our "world model" is formed through impromptu thought-experiments resembling daydreams and imaginative fantasies.

The current advance of the global entertainment industry into VR applications is perhaps an inevitable development, but it is one which we at VRASP believe will turn out to be of tremendous importance for the VR industry as a whole. The use of VR as entertainment cannot help but to increase public awareness, understanding, and confidence in this amazing new

technology. A debt of gratitude is owed to those brave companies who are spending their time and energy creating such applications.

To this end, we are pleased to depart from our usual format in order to bring you this **Pix-Elation Special Edition**. We hope you find it **edutaining**.

— *The PIX Staff*

StateMent of PurPose

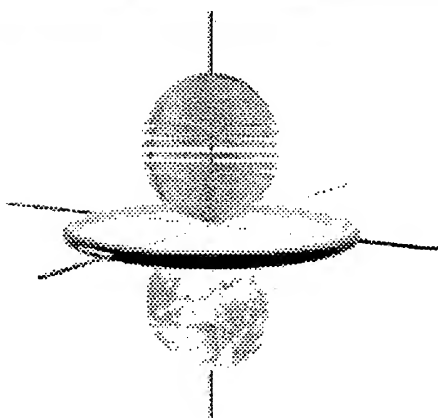
VRASP is a support network and educational forum devised to increase public knowledge of virtual reality and further the development of VR technology.

We provide a cohesion for the diverse followers of VR including student and professional researchers, inventors, programmers, promoters, marketers, writers, film makers, and philosophers.

VRASP is presently acting as a resource bank and a referral network for those seeking information in the VR community. There is a clear need for "veracious" information to be presented to VR followers and, most particularly, the public. We can be the source people turn to in order to learn more information about VR or be given a book title, academic contact, research laboratory name, etc. so people can follow up on their own interests. Additionally, we promote our own educationally oriented events as well as those organized by others.

VRASP offers a bimonthly newsletter, Pix-Elation, featuring transcriptions of important discussions and events in the scientific community, interviews with the leading researchers and proponents of VR, as well as thought-provoking editorial columns, graphics, VR news and feature articles, and a calendar of upcoming VRASP and VR events.

Any member can contribute articles, commentary, photographs, or computer generated art to Pix. Contact the editor for format requirements if you send diskettes. Every effort will be made to include the submissions in a timely manner. Submissions must be accompanied by a self addressed stamped envelope if you would like them returned.



Corrections

Credit is due: the designer of last issue's cover was Ryan Campbell, rendered on a 386 and various computers of his own making. Thank you!

Cover

Sistine Chapel graphic drawn by Dawn Sage, assembled by Zyzzy Galore.

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Is VR THE NEW WASTELAND?

Ira Meistrich

1950. Americans bathe in the flickering blue light emitted by the squat boxes newly arrived in their living rooms. Feeble television signals cover little of the continent, and the cost of the boxes initially limit their buyers to an educated, affluent urban elite. A generation of neophyte television viewers tune into black and white visions of Shakespeare on "Hallmark Hall of Fame," where torches flare in smeared black-rimmed penumbras from camera tubes that can't handle the burn-in. Out in the streets, wild-eyed prophets carry signs proclaiming, "I have seen the future." (Did they know it would be 'Geraldo'?)

1993. Pale-skinned programmers with red eyes and purple hair swim to the turbulent surface of VR conferences, exotic fish emerged from the turbid depths of the computer oceans. Exhibit halls hum the high-frequency whir of hard drives and CPU fans, and HMDs sprout like hi-tech mushroom caps. Immersed in virtual worlds, normally respectable people lurch like drunken actors, so many Macbeths clutching at daggers they see before them, virtual daggers not "...sensible to feeling as to sight."

VR today is like early TV: it suffers from the split personality of most start-up high-tech industries. At the one end is the top of the line research, carried out by institutions with no mandate to sell anything.

At the other end, we have new hardware and software products whose developers are only too happy to demo them at a plethora of VR conferences, but where the differences in product are less important than the similarities. It's like having a VCR and no movies to rent: who needs it? Virtual Reality will continue as the domain of media hype until its supporters and developers start to pay closer attention to the content of what they put out.

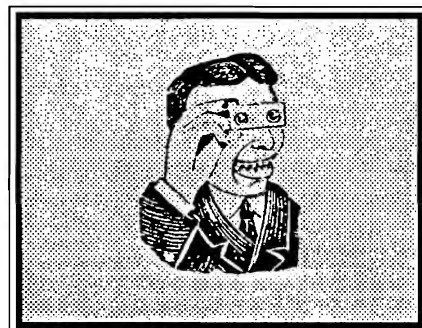
There is no question about VR's importance to medical or other high-end research. Nor is there any question about its value to architecture or other design-related fields. And as a developing new entertainment industry, it is already recognized as a gold mine waiting to be exploited. But what about other, more humanistic areas?

Virtual Reality can open other avenues down which we can explore and re-interpret more traditional, more familiar landscapes. Like our virtual Macbeth, a new format for the exploration of literature awaits, no longer simply between the pages of books. History can become more a present-tense experience, one in which we can better understand the stresses and influences that came to bear on events in our past. We are far too used to being omniscient, judgmental know-it-alls having the past explained to us from

across the safe boundaries of linear narrative. But does that allow us to truly understand, or merely critique? Virtual history can help us appreciate much about why things happened the way they did.

In the world of music, we can return to some the vision of Fantasia, and allow our music to take on substance far beyond its current auditory level. Even modes of human experience as ancient and transcendent as worship may be affected. Can you imagine the impact of a truly immersive rendering of something like the twenty-third psalm? I can, and I think it would be a lot more calming at the end of a long hard day than a stiff drink.

Enough shoot-'em-up arcade games. Somewhere behind the facade of every TV test pattern lies a "Masterpiece Theater." Let's find it. VR won't have any true meaning to the human experience until we do. Δ



Conference craziness is upon us all. It's what we bemoan, bitch about and beg to be involved in.

Remember that old saw? Be careful what you wish for, you may get it? Well, VRASP got it and good. May will see the debut of VRASP at the largest virtual reality specific conference in the US: Meckler in San Jose. I was there as press - it seems only yesterday, but it was in September of last year. However, exhibiting on the other coast is a huge step, one which will require a concerted effort of all VRASPians who are able to help out. So I ask for immediate volunteer support in any capacity from anyone. Please get involved and help VRASP reach its largest audience yet.

Why go to this trouble? We need to support and bring the west coast members, specifically, the start up northern California Cell under the guidance of Doug Faxon of Santa Rosa, into the mainstream of VRASP activities. As readers of my "About the Virtual Town" column can tell, one of our most successful activities is conference networking. And since VRASP has a smattering of international members, I feel we can no longer remain confined to the convenience and relative ease of strutting our stuff only on the east coast. We have an lot to be proud of, so let's show the world!

Particularly pride-instilling is this issue (which will be the one shown at Meckler), because it features an awesome sur-

A LETTER FROM THE EDITOR

Karin August

vey of practically every company doing VR research in the entertainment realm. Randy Sprout did a yeoman's job in ferreting out information that had heretofore been known only to an elite few.

Also in the works is a "knock your socks off" virtual world project under the direction of Ira Meistrich and Bill Meredith. We are going to need designers, modellers and programmers familiar with creating 3D objects in a variety of CAD programs. Also needed are sound and video (Windows) specialists. I think we are ready to show just how technically proficient and creative VRASPians can be.

A few weeks ago VRASP exhibited at the first large New York City VR conference, VR Systems '93. This was a proving ground and we held our own. We also provided 17 volunteer staffers to help the conference organizers - in exchange for their free admission to the show - a sav-

ings of \$800. This was a mutually beneficial arrangement and proved that people knowledgeable about the technology and industry will really support a conference effort.

And in just a few more weeks, the VRASP PC Glove Workshop will be held as part of the IEEE Electro conference. Thanks to the extraordinary programming skill of VP Mark Pflaging, registrants will learn brand new gesture recognition techniques, get a new driver for Windows, as well as see the first Power Glove created for the left hand. There is also a full day course being given by VRASPian Greg Burdea that focuses on virtual reality systems and applications. **Contact Karin immediately if you want further information or to register for the workshop being held daily during the April 27 - 29 conference in Somerset NJ. For info and registration for Greg's course call conference management at (800) 877-2668.**

VRASP is gaining momentum seriously, and Meckler in May will see a peak. Not the ultimate peak of course, because it's clear VRASP is here to stay, and that there will always be grander and crazier things around the corner to involve us. But we do need your help now, so send in the attached volunteer profile as soon as you can and find out the rewards and opportunities of active involvement in your Alliance.

- K.

PIX-ThanX

The following members have contributed their time, talents, and energy to recent VRASP activities such as 'Chats, conferences, online brainstorm, and/or PIX. Our sincere thanks go out to these outstanding VRASPians:

Robert Armas, Greg Burdea, Dave Campbell, Don Chait, Ed Costello, Dave Eagan, Doug Faxon, Tod Foley, Janet and Ed Galore, Eben Gay, Daniel Gomez, Marc Gumpinger, Craig Halperin, Tamara Howe, Jon Keck, Iain Marshall, Dale McGrew, Ira Meistrich, Bill Meredith, Paco Xander Nathan, Christopher Penrose, Mark Pflaging, Lyn Ratcliff, Kevin Riley, Richard Rodkin, Don Rose, Mark Schrimsher, Patrick O'Shaughnessey, Randy Sprout, Wilbur Streett, Tim Sullivan, David Szego and Rob Tow.

These nonVRASPians also have our gratitude for helping out at the New York City conference: Dirk van Gelder, Claudio Guzman, Dennis Landi, Christian Liendo and Jacqueline Spiegel.

Further, a special thank you goes to Stan Goldstein and Rosemary Hopkins of *VR Systems* and Gerry Alphonse of *Electro*.

ABOUT THE VIRTUAL TOWN:

Karin August

So you want to volunteer at a virtual reality conference?

Better not have purple hair. Tim Sullivan from Canada had reddish purple hair and nearly brought about two apoplectic fits and a boycott of VR Systems '93 by all VRASPIans. Heaven forfend national TV should think the vr industry was populated by other than corporate suits or preppy Americans. Carrie Swift, the Media Relations medusa, heard about this volunteer's hair color, which was really more red than purple, and acted like a toro of Toledo, but without the dignity. My stress levels reached new highs.

Better have a snow plow. Twenty-four inches of white stuff got dumped on the whole area 2 or 3 days before it was due to begin. People were trapped at assorted airports near their homes or halfway across the country. If in fact they managed to get out of their driveways at all.

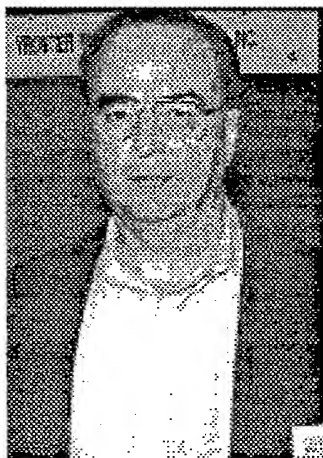
Better bring personal ventilation kits to counteract rogue thermostats heating the exhibit hall to 80 plus degrees. Oh and canteens, too; water was always scarce.

Did I mention ear plugs for when certain people would go into their self aggrandizing spiel/promo? And Black's Dictionary for contract law...and mal de mer pills for vr rides...the patience of Job...the artificial rictus called a conference smile....

You're sure you want to volunteer for a VR conference?

O 4 SUM HELP

"WHAT TROUBLE HAVE YOU GOTTEN YOURSELVES INTO NOW?"



"I DON'T KNOW, ED. IT SEEMED LIKE A GOOD IDEA AT THE TIME. HOW ELSE COULD SO MANY DESERVING VRASPIANS ATTEND SUCH AN IMPORTANT CONFERENCE FOR FREE? AND GET TO WEAR CHRISPY CLOWN BADGES!"

CALLING ALL HANDS!

VINCENT JOHN VINCENT
AND HIS POWER PALM



THE DON OF DEXTERITY
WAS SEEN TALKING TO
HIS FRENCH PUBLISHER:

"JE VEUX MON ARGENT
ET JE LE VEUX
MAINTENANT!"

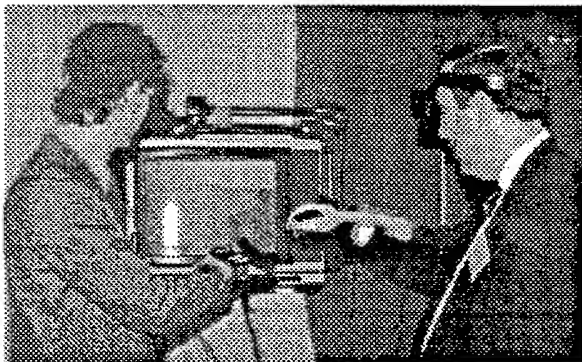
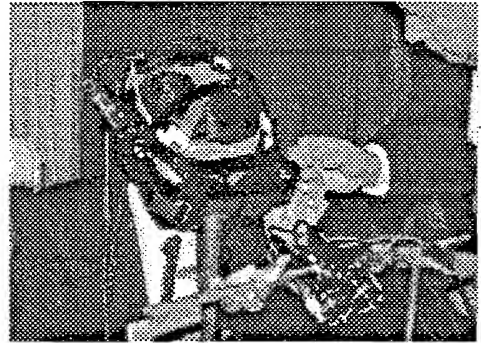
NEW YORK CITY IN 2D



STEVE WARME AND VIVID
ROOSTER...FINGER FLICKIN' GOOD!

BIZARRE COURTING RITUALS ENSUED...

A NEW TWIST ON EYE
GAZING AND HAND HOLDING



"SHALL WE DANCE A
PAVANE?"

"No, DISCO!!"



REND 386 CO-CREATOR BERNIE ROEHL SHAKES
POWER GLOVES WITH VRASP VP AND GLOVE
GURU, MARK PFLAGING

VIRTUAL REALITY ENTERTAINMENT DEVELOPERS: AN INDUSTRY OVERVIEW

Randy Sprout ©1993

There are many exciting projects under way in the emerging VR/Interactive Entertainment industry. I have tried to turn over every stone in my research effort to find companies that are working on VR entertainment projects of any sort. Some of these are well known; others are not — but could be in the future.

In this nascent industry, it is difficult to find and verify everything. Companies are secretive, and with good reason. I therefore apologize in advance for any missed companies or projects, and for any included inaccuracies, although I hope I kept the latter to a minimum. A few companies I spoke with asked me very politely not to include certain information on their work. In the interest of protecting the competitive health of these companies and of the industry, I shall honor these requests.

While researching this article, I was repeatedly confronted with the question "What is virtual reality?" My answer? "That's a good question!" I have attempted to retain a very broad definition of VR Entertainment, in order to include as many companies and projects as possible. It is left to you, the reader, to decide for yourself who to include in the group, based on your own personal definition of VR. Many very good documents have attempted to define VR; I can recommend an excellent one by Mr. Steve Glenn of SimGraphics Engineering (see bibliography).

If any of you are interested in discussing these projects or this industry in more detail, I would love to talk with you! Please contact me via email, rsprout1@well.sf.ca.us, and we can connect. If there are any companies out there that didn't make it into this article, please let me know.

Abrams-Gentile Entertainment New York, New York, 212-757-0700

Abrams-Gentile Entertainment, one of the partners that created the Mattel Power Glove™, usually keeps quiet about developing projects. The company has been active in VR entertainment for years, and designed Japan's Perception Circus™ theme park in Osaka. This park, scheduled to open in the mid to late '90s, will feature four pavilions, each built around a different VR experience.

Alternate Worlds Technology Louisville, Kentucky, 502-426-0903

Alternate Worlds Technology (AWT) has been active in the VR entertainment market since it introduced its first game, Wolfenstein VR™, last July. AWT's game uses the same theme made popular by Id Software's game, Wolfenstein 3D™. The player searches through a Nazi headquarters and confronts armed soldiers. It's kill or be killed! AWT has modified Id's routines for use with a Virtual Research HMD and Polhemus head tracker. The game has some 3D sound capability.

Mr. Andrew Prell, President of AWT, told me that he and his team have really increased the challenge and action of the game. There are 30 different levels, and every other level has a "boss," the videogame term for "big bad dude." Since July, AWT has sold a total of 12 machines to facilities in Michigan, Chicago, New York, and of course if its home city of Louisville. Games have also been shipped to Italy and Korea.

Mr. Prell also described his recently released second game called CyberTag™, in which players sneak through a small maze and shoot each other. Two players can be networked in the same maze, and can communicate over intercoms to taunt each other. Within six months, AWT will be releasing a second version, which adds complexity to the game as well as the capability to network up to 16 different players in different cities.

Atari Games Corporation Milpitas, California, 408-434-3700

What is happening at Atari? They had a great start with the innovative game Hard

Drivin'® and followed-up with Race Drivin'®. Both, by most standards, cross the line into VR because of the use of an interactive virtual world, 3D polygon graphics, force feedback, and stereo sound. Since then, Atari has released other arcade games which also offer VR-style features.

I spoke to Ms. Mary Fujihara, Director of Marketing, about Atari's new products in the VR entertainment area. She said that they plan to continue releasing high-end arcade games similar to their previous games, but it may be a while before they focus on immersive HMD-type VR games. "The technology is still too expensive and the performance too low to create high-volume, cost effective and highquality games," she explained. Atari is systematically developing VR hardware on its own and preparing for the day that the price-performance characteristics make sense before they roll out HMD games.

AWH Video Enterprises Tacoma, Washington, 206-922-9521

AWH has been working on a VR system for well over a year. In fact, its first product can be seen in the Center House at the Seattle Center in the "Video Dude Amusement Center." This system runs on a 486-50 PC and uses a Virtual Research Flight Helmet and Logitech tracker. Mr. Albert Hunton, AWH's CEO, is quick to say that his system is not a game. He is much more interested in educational and "explorational" applications.

The system is based solely on exploration. The environments are worlds connected by portals.

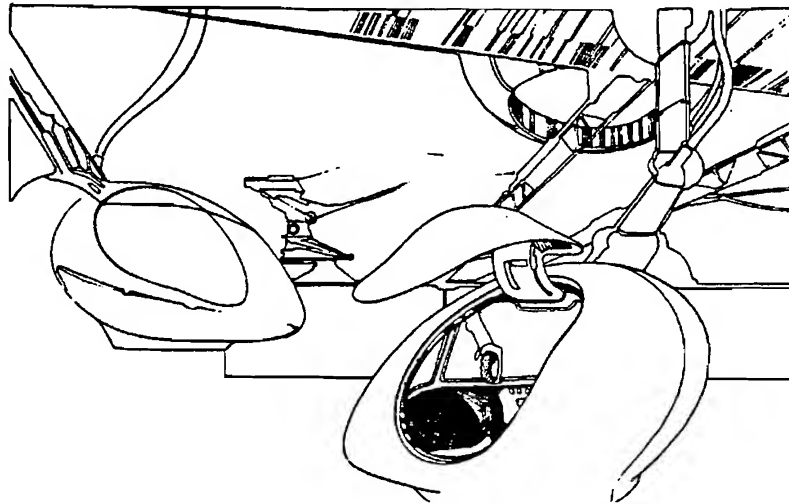
A user can start by flying around a scene containing the great pyramids, then move through a portal to explore a planet in space. After looking around awhile, she can discover another portal which leads to an office space, where she can look at notes, books, and furniture, and finally fly through a picture on the wall into a maze and then on to other worlds. Mr. Hunton is probably the source of some very valuable market information, as he is now quite familiar with how people are responding to a non-violent form of entertainment.

The long-term goal of AWH is to perfect a home dial-up VR network which can be accessed through PCs. At this time, Mr. Hunton admits that HMD technology and bandwidth limitations are keeping him from implementing his plans as quickly as he would like, but the AWH team is pushing forward as quickly as they can to develop the necessary technology. AWH is also a VR consultant to Pacific Northwest architectural and engineering firms and creates immersive walkthrough systems for them.

Bullet-Proof Software
Kailua, Hawaii, 808-263-2305

The crew at Bullet-Proof Software uses the beautiful environment of the Hawaiian Islands to keep its creative juices flowing. This highly successful game software team has created a number of hit games in Japan and controls the Japanese

assisting with building the prototype and lending technical support. International Telepresence, based in Vancouver, Canada, is a leader in the field of medical and industrial remote sensing, and also assists with the technical tasks for the project.



Bullet Proof's E-Scape™ pods were designed by 'Curved Space', the architectural firm of legendary artist Roger Dean.

At the heart of the E-Scape entertainment center is the "EPod," or Electronic Personal Orientation Device, a twoperson capsule that looks like something from a futuristic fantasy. Each E-Pod is equipped with simple navigational controls, and a high-definition TV monitor acts as a window into the E-Scape world. Up to 16 pods can be networked for users to

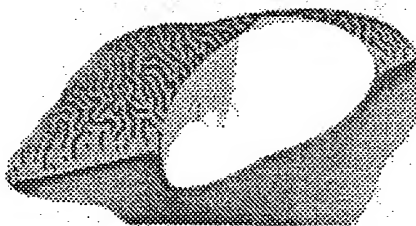
rights to Tetris™. Now BPS is using these victories to launch itself into the future of location-based entertainment. It has teamed up with strategic partners Animatec, Curved Space, The David Sarnoff Research Center, and International Telepresence to develop VR entertainment centers called E-Scape™.

Animatec is a Moscow think-tank where some of Russia's top scientists are developing ways to create photorealistic syn-

compete or collaborate. Microphones and stereo speakers allow players to communicate between pods. While the first-generation product will not be on a motion platform, the second generation will be. BPS plans to set up these entertainment centers to provide a complete experience beginning right when a person walks in the door. The entire atmosphere of the complex will be carefully orchestrated to capture the E-Scape theme.

BPS is using this technology to create a variety of worlds and experiences for E-Scape such as fantasy adventures, scenic excursions, thrill rides, futuristic combat, and more. Mr. David Nolte, Producer for the E-Scape project, absolutely could not contain his excitement. He told me that the stuff coming out of the Animatec labs is incredible: artificial fish, waterfalls, volcanoes, and other amazing synthetic life forms.

The E-Scape team is currently working day and night to complete the first prototype E-Pod in time for key trade shows this summer. Mr. Nolte hopes that they will have it ready by the Consumer Electronics Show in June, but says that they



thetic objects to populate E-Scape's virtual worlds.

Curved Space is the architectural firm of world-renowned artists Roger and Martyn Dean, designers of the pods used in E-Scape. The David Sarnoff Research Center, a top U.S. technical powerhouse, is

will certainly show it at SIGGRAPH '93. The company has lined up its first E-Scape location in Bellevue, Washington, and is actively seeking other franchisees and financial partners. At the moment, BPS is preparing a video to be shown at the Meckler VR Conference in May.

Chameleon Technologies
Alexandria, Virginia, 703-684-8005

The me parks: get ready for **Chameleon™**! This startup company is about to unleash its self-named first product: a massive, multi-passenger VR ride for theme parks, carnivals, fairs, and sports events. The

largest version of the ride has ten two-person gondolas, which move independently on the ends of spokes radiating out from the center. The whole thing rotates at 18 rpm, and all of the gondolas are networked together so that riders can compete and interact.

Ms. Susan Goodman, Business-Finance Manager, told me that this will be the first truly interactive simulation ride for the amusement industry. Chameleon just had its two-year anniversary. Its parent company, Veda International, has been in the military simulator biz for a long time and created Chameleon to go after the entertainment market. Why "Chameleon?" Ms. Goodman explains, "Our ride is quickly and easily configurable in about five minutes to change from one game to another, just like a Chameleon."

Each "gondola," as they are called, can move in three rotational degrees-of-freedom in addition to the constant circular motion of the ride. This gives the riders the feeling of g-forces so they feel as if

they are truly flying or driving, depending on the game. A large 38" x 52" rear-projection monitor is mounted in front of the gondola and each is equipped with a steering wheel and a joystick.

Chameleon currently offers two games for the ride: a formula racing simulation on a windy track called **F-1** and a jet combat game called **Thunderbolt**. In the

product announcement; I think we'll be hearing from CyberZone before too long.....

Dean Friedman Productions
Peekskill, New York, 914-736-3600

I spoke briefly with Mr. Dean Friedman at the VR Systems '93 conference in New York City. He has created a number of interactive VR games for use in public

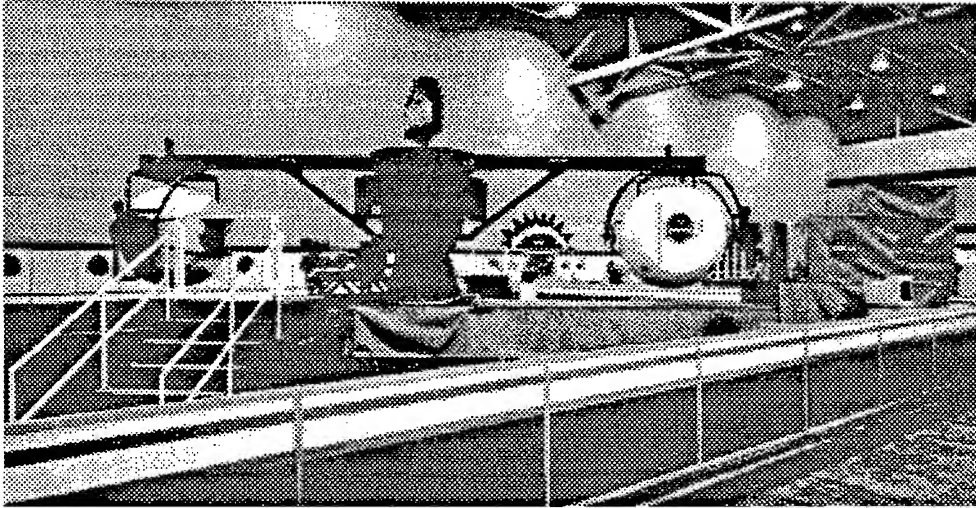
places, museum exhibitions, and even on broadcast T.V. His system, called **In Video™**, uses a camera system to collect the image of a player who stands before a blue screen. In front of the player is another screen which displays a computer-generated virtual world. The system then

combines the image of the player with the virtual world, so that the image is seen inside the world. By watching the screen in front of her, the player can move her "mirror image," touch and interact with objects on the screen.

Mr. Friedman has created applications for entertainment, education, and information. One of his most popular creations is "**EAT-A-BUG®**," an interactive game show on the Nickelodeon Children's TV Network, in which contestants can attempt to snatch flying insects out of the air to compete for points. His team is now working on plans to create stand-alone coin-op systems for sale to arcades.

Disney Imagineering
Glendale, California, 818-544-6500

With the great success of **Star Tours**, it is hard to imagine that Disney is not pursuing interactive VR entertainment with a passion. But one of this company's great disciplines is secrecy, and now is no



Are you ready for Chameleon™?

latter game, players fly A-10 aircraft over farms and mountains and must shoot at helicopters in the air and tanks on the ground. Ms. Goodman also hinted at an "in-the-works" project they are all very excited about. It's a futuristic game where pilots fly through a huge network of tunnels at high speed, avoiding enemies and making real-time decisions about which tunnels to take. The first ride should be going on public tour this summer, and another will be installed in an unnamed permanent theme park soon thereafter.

CyberZone
Sarasota, Florida, 813-359-8394

CyberZone™ has stayed well hidden during its secret development of a fully-immersive HMD-type VR game system for the arcade market. I tracked down this start-up company and spoke with Mr. Steve Geden, CyberZone Design Engineer. He tantalized me with some details on the project, but asked me not to print them. Shucks, it's really an exciting project, too! Keep your eyes open for a

exception.

Let's keep a watchful eye on them for spectacular innovations in VR entertainment.

DP Research Corp.
Cambridge, Massachusetts, 617-576-5864

DP Research Corp has been secretly preparing for the explosion of networked VR for years, creating multiplayer simulations for clients in the food & drug, entertainment, and energy industries. The company, with satellite business offices in Atlantic City, London, and Los Angeles, has strong technical competency in many areas of hardware and software technology. Its Telerobotics group has created tiny robots similar to the ones in the Robin Williams movie "Toys" (only friendlier).

These intelligent robots, called **micro-rovers**, were developed using subsumption technology. The amazing thing about them is that they are built from off-the-shelf parts and use extremely compact AI software developed by DPRC's robotics wizards. The company plans to sell these microrovers to consumers as kits, and to establish locationbased entertainment products which allow people to see from the viewpoint of the microrovers via telepresence. The software will be made available separately as well.

The Simulations Group is the center of VR activity for the company. DPRC Simulations spokesperson Bob Racko told me that the team is currently putting finishing touches on a potentially huge networked environment which allows a person to use the service via home electronics equipment, and play games with others in a 3D virtual world. This ambitious project operates with off-the-shelf technology, and is scaling up for thousands of simultaneous players at once! Mr. Racko explains that DPRC has found it necessary to patent the innovations which make the system work well within today's technology limitations. The company plans

to work with manufacturing partners as appropriate, to create affordable and widely available access hardware. LBE setups will also be made available for use in casinos and resorts.

The key to the entire project, he says, is "people versus people" competition. Players will be challenged by others who are at their same skill level and who act

this service would pay actual dollars to the "proprietor" to improve their "bodies." Mr. Racko expects that people could earn significant revenue from conducting network businesses of this type. I wonder what the tax implications will be?

Evans & Sutherland, Simulation Division
Salt Lake City, Utah, 801-582-5847

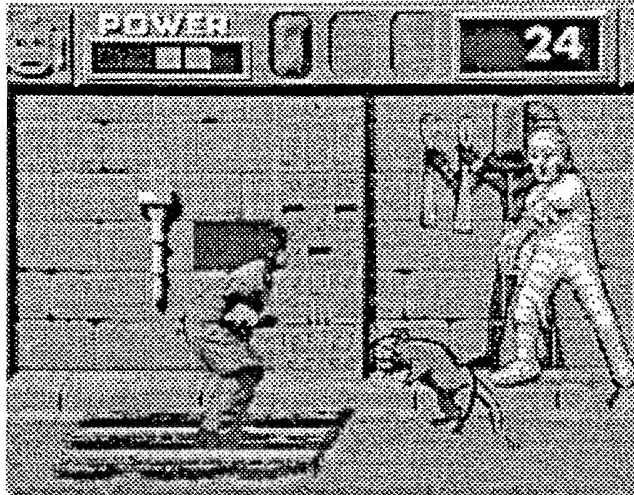
Evans & Sutherland is one of the pioneers of VR technology. A long-time supplier of military simulators, the company has probably explored almost every imaginable way of immersing a person in a virtual world. E&S has built megadollar simulators, sparing no expense to achieve highquality experiences for military trainees. Its military work continues: it has recently received a major contract from the Army to work with IBM to create a networked simulation system of tanks, troops and planes so that a large tactical force can run coordinated training.

These high end simulator programs have helped E&S develop great expertise in most

areas of VR technology; it is now applying this expertise to the commercial sector. Having decided to make its first major venture into the entertainment industry, E&S has teamed up with Iwerks Entertainment to realize their goal.

The joint project, **Virtual Adventures®**, is a unique, high-end entertainment attraction designed for use by theme parks and LBE complexes. The ride will contain virtual environments and characters, which could be developed from fantasy literature or from film and television. Based on real-time computer graphics and sound, the environment is totally interactive, allowing riders to explore worlds as they wish. The systems can also be networked so that riders can compete with adjacent teams.

Business Development Manager Mr. Jeff Edwards informed me that each Virtual Adventures unit will have seating for 4-6 people, who will each have an individual role to perform in the simulation. Each



The magic of Dean Friedman Productions puts you InVideo™.

unpredictably, not simply as a programmed machine would. Not only are users able to meet each other on-line, but the world is also populated with special "actors" hired by DPRC, who take care of the special needs of a given user. The identity of these actors, however, may very well be hidden from the users, and indistinguishable from other players. The effort in this project above all else has been to produce an extremely entertaining and engaging environment which takes into account the way people think, feel, interact, and become motivated.

DPRC also intends to promote commerce among the users of the network. People will be allowed to "set up shop" and start "virtual businesses" of their own. For example, since each user is represented by a graphic model of a lifeform (human or otherwise), an enterprising person might start a business that could customize and beautify another user's representation, or body, similar to a plastic surgeon in the real world. Users who wanted

may also have a different type of input device to use. Every player is essential to the success of the team, so all must work together and make fast-paced decisions as a committee in order to complete the adventure. What fun! Mr. Edwards said that they currently have prototypes up and running, and are experimenting with them.

The product was announced at the International Association of Amusement Parks and Attractions (IAAPA) exhibition in November 1992. Mr. Ron Sutherland, Executive Vice President of E&S' Simulation Division and Mr. Stan Kinsey, CEO and co-founder of Iwerks, said at that time that they plan to demonstrate the system in Fall, 1993 and install the first units in the summer of 1994.

Horizon Entertainment
St. Louis, Missouri, 314-331-6000

Horizon, of course, is extremely active in VR entertainment. It began importing *Virtuality*™ systems from **W Industries** in late 1991, and has purchased and placed over 90 of them in just over a year with both private arcades and in its own company-controlled entertainment chains: Time-Out, Space Port, Exhilarama, and Dave & Buster's. Even now, the company is working closely with W to prepare the American market for *Virtuality 2*™. Horizon is a powerhouse backed by its parent company, Edison Brothers Stores; a huge mall retail conglomerate with \$1.5 billion in sales. So, when Horizon talks, the industry listens.

What's Horizon talking about now? **Star Trek**®! The company has joined with Paramount Pictures and Spectrum HoloByte to create mall entertainment centers based on **Star Trek: The Next Generation**. Horizon President Mr. Andy

Halliday describes these facilities as much more than just simple games. They will re-create some of the physical space of the Starship Enterprise, including the bridge, transporter room, holodeck, shuttlecraft, and more. Sets will be right out of the TV series. Players take part in interactive group adventures and play key roles in the unfolding story. They sit at various operating stations, and can use

and a restaurant that serves Romulan ale, Klingon "Gaaaagh" (*Note: This is my translation of whatever it was that Andy Halliday said to me in Klingonese!*) and other even more obscure delicacies of "the final frontier."

The whole thing sounds like something out of our most wonderful fantasies, but Mr. Halliday takes great care to keep the finer details of the project confidential,

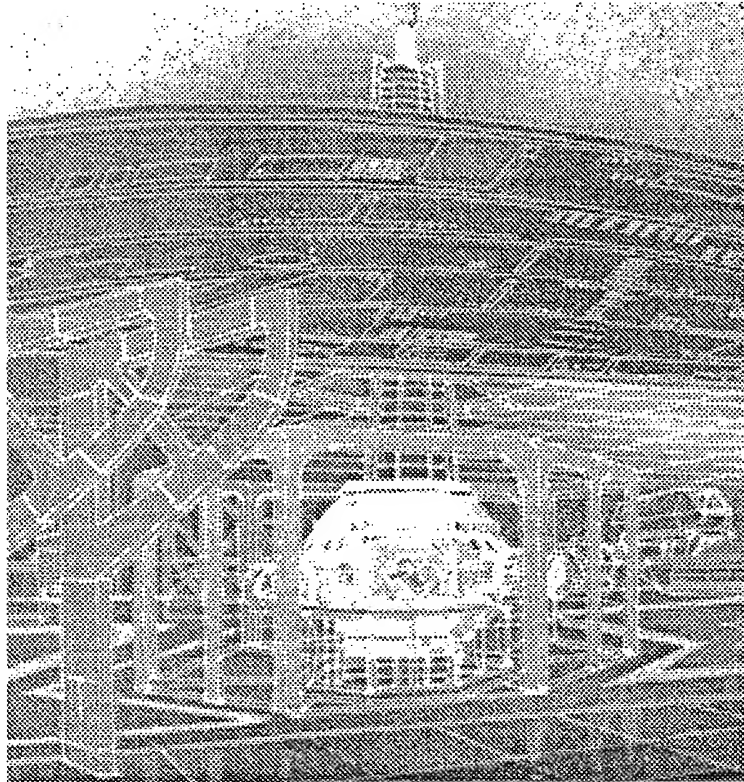
such as the date and location of the first facility, in order to minimize hype. He does commit, however, to opening the first, somewhat scaled-down version before the end of 1993. It is unknown right now exactly how far the partnership is along the road to completion, but I get the impression that heavy resources are being channeled from all three companies toward these Star Trek centers.

Hughes Training
Arlington, Texas, 817-695-2000

Hughes Training is an experienced player in the military flight simulator business, and is now using that expertise to enter the public entertainment market with the *Mirage*™ LBE system. I spoke with Mr. Dwayne Humphrey,

Vice President of Visual Systems Marketing, about his project. In the early stages of development, Hughes had teamed up with LucasArts® Entertainment. However due to undisclosed reasons, that partnership no longer exists.

Mirage uses a collimated optics system which gives it a very large field of view (120 degrees horizontal by 30 degrees vertical), and allows the viewer to focus on infinity to see objects that are supposed to be at great distances. Each Mirage cockpit is equipped with a very high quality sound system and seats two people: one flies the craft and the other



Horizon has joined with Paramount Pictures and Spectrum HoloByte to create mall entertainment centers based on **Star Trek: The Next Generation**.

working controls, fly shuttles, or beam away as part of an "away team" in this multiplayer fantasy. Paramount itself will be instrumental in helping Horizon and Spectrum HoloByte to create the action scenarios.

VR will play a central part in all this. HMD-type hardware will allow "away team" players to beam down to planets and experience cockpit-simulations of a warp-drive equipped shuttlecraft. Some of the latest VR hardware technology will be utilized. The whole center will be chock-full of theatrical special effects. Adding to the fun is a Star Trek gift shop

controls the guns. Up to 16 pods, mounted on a fixed base, can be networked for interactive adventures.

Hughes has a prototype up and running and is demonstrating it to potential customers. The company has no plans to go into the retail entertainment business, but will sell the Mirage units and customize games for those who do. I saw a photograph of a Mirage capsule — it's huge, standing almost ten feet high! It definitely looks like a futuristic space combat vehicle.

At this time, Mr. Humphrey cannot say when the first unit will be installed in a public location.

IMAX

Mississauga, Canada, 416-844-4363

IMAX has been a leader in specialized theaters and productions for the entertainment industry for years. Though you can't interact with the movies shown on those huge screens, you still often feel immersed, just because the screens cover so much of your field of view.

Advanced Imaging Specialist Mr. Dave Martindale says that IMAX is looking at VR technology with interest, but isn't actively pursuing anything at the moment. The company is interested in HMDs as an alternative to huge screens for wide-angle display of cinema, but is waiting until resolution improves and huge bandwidths (greater than a gigabyte per second) can be handled.

Iwerks Entertainment

Burbank, California, 818-841-7766

One of the leading designers of giant-screen films and technologies for the special attractions market, Iwerks has designed and installed more than 40 special venue movie theaters in 35 sites around the world, chiefly in theme parks, world's fairs, educational institutions, and visitor's centers. Founded by ex-Disney execs Mr. Don Iwerks and Mr. Stan Kinsey in the mid-eighties, the company is dedicated to exploring and developing leading-edge entertainment. It has three major projects in the works in the VR entertainment area: **Virtual Adventures®** with Evans & Sutherland, **VActor Performer™** with SimGraphics Engineer-

ing, and **Cinetropolis®**.

Ms. Kirsten Fossan, Director of Project Management, told me about Iwerks' role in the Virtual Adventures project. Iwerks and Evans & Sutherland joined forces in September of 1992 to develop a new virtual reality product. Iwerks brings its creative and sales and marketing experience to the partnership, while E&S brings its high end computer graphics technology. Both companies will share in the manufacturing responsibilities for the product.

Ms. Fossan also referred me to Mr. Eric Finke, who is in charge of Iwerks' sales and marketing of **VActor**, the new product from SimGraphics. In November

I saw a
photograph of a
Mirage capsule —
it's huge, standing
almost ten feet
high!

these two companies announced an agreement to work together to market this exciting new real-time animation system. Mr. Finke could hardly contain his enthusiasm as he described **VActor**, which he calls "the world's first sophisticated character animation product." Referring to Iwerks' excellence in entertainment marketing, Mr. Steve Glenn of SimGraphics stated, "We are really pleased to team up with Iwerks Entertainment as we believe that no other company is as capable of selling and supporting our product."

Iwerks, backed by the Japanese heavy-weight Itochu, has announced a major effort to create "movie parks" based on its innovative theater technology. The first **Cinetropolis** entertainment center is planned to open in late 1993 in Redyard, CT. It will be a combination of regular motion picture theaters, retail venues and

restaurants, plus Iwerks' full array of interactive experience products (referred to by Iwerks as "reprogrammable software-based attractions"). These include Iwerks' **Giant Screen Iwerks 870® Theater**, **Virtual Adventures®**, the **Turbo Tour®** simulation theater, and **Video 360®**, a 360degree theater. As Iwerks builds more of these centers, it will become increasingly economical to create higher-budget experiences for attractions. Wow! Our entertainment world is changing fast!

Ixion

Seattle, Washington, 206-282-6809

Ixion describes its new **VR Slingshot™** as "the first true VR sport for home players." The game can network two computers via modem for tele-competition. Players wear stereoscopic glasses and use joysticks to see and control a spacecraft and fly through outer space. The first player to deplete her opponent's energy reserves wins the game, which usually lasts about fifteen minutes.

I tried the game at the VR Systems '93 conference in New York and really enjoyed it. I wore SEGA 3D glasses and sat at an Amiga computer equipped with joystick and a booming sound system. At first, it was a bit tricky to fly my space fighter in 3D using only a joystick, but after a bit I figured it out and turned my attention to blasting my opponent (who was still struggling with his joystick).

Fun! I can see how this might become addicting, especially if I could play against someone I knew in another location. The game is now available for the Amiga and Ixion expects to have a PC version ready by June.

Kinney Aero

Irvine, California, 714-855-0847

The folks at Kinney Aero, Inc. are the creators of **Fightertown®**, a location-based entertainment complex featuring a number of fighter jet simulators. Since the facility opened last May, **Fightertown** has attracted a growing number of Southern Californians who want to experience the thrill of being a hot-shot jet pilot.

Mr. Dave Kinney, President of Kinney Aero, has been developing this concept

for eight years, and has really taken a long-term view of the project. Once he and his partners were convinced that the Fightertown idea was a sound opportunity, they founded Kinney Aero in 1988 and started along the long road to victory. Since they didn't have the funds to launch their plans immediately, the partners designed and sold components to the aerospace industry and saved every penny to develop Fightertown. Over time the KA team gathered great technical expertise in the necessary areas to create realistic flight simulators for the public, and Fightertown was born. "The success of Fightertown is a direct result of the efforts of some really talented and dedicated people," said Mr. Kinney. "We design almost all of the hardware and software used at Fightertown, and there's no way the project would have been completed without our great team."

The facility features some of the military's hottest planes: F-104's, F-16's, F-111's, and F-4's (though the latter is being phased out to make room for KA's newest simulator, the F-18), and the company will soon be adding motion to its already highly realistic simulators. The flying experience can be tailored based on skill level: an absolute novice can enjoy a flight on a low skill setting, but even a real F-16 jock can be challenged on the higher settings. These flights don't come cheap, about \$28 for a single seat and \$50 for a two-seater, but considering the overall length of the experience, the price is a bargain. The pilot checks in by appointment, dons full flight gear, has a half hour briefing and instruction period plus ten more minutes of cockpit instruction. The actual flight mission lasts for a full half hour and afterward the now-experienced jock has a short debriefing.

Mr. Kinney told me a bit about the success of Fightertown to date and I had to catch my breath. But, he asked me not to brag too much, so I won't. Suffice it to say that he most definitely has expansion plans and will open two more facilities in North America this year and triple the floor space of his flagship Irvine Fightertown in July.

LucasArts Entertainment
San Rafael, California, 415-662-1700

At one time, LucasArts® was working closely with Hughes Training to create "Star Wars" experiences for the *Mirage™* simulator. Mr. Kevin Teixeira of Intel has an excellent description of this and other LucasArts VR projects in his book *Virtual Reality: Through the New Looking Glass* (co-authored with Mr. Kenneth Pimentel of Sense8).

Events, however, have taken a turn at LucasArts. The company recently reorganized and the various business units

The capsule has
a canopy top
which pops open,
and the interior
has the look and
feel of an aircraft
cockpit —
complete with
joystick and a 4
strap safety
harness.

were pulled together under one roof. Lucasfilm confirmed that two of the leaders of the VR entertainment effort at LucasArts, Mr. Adam Grosser and Mr. David Fox, are no longer with the company. Hughes Training verified that it is no longer working with LucasArts to develop *Mirage*. While LucasArts Games Group is continuing to make advances in technology for action-adventure games for the PC and home game systems, it seems that the company's immersive VR projects may be on hold for now.

Magic Edge **Mountain View, California, 415-965-8819**

In the course of my research I contacted Mr. John Latta (President of 4th Wave, Inc.), who is regarded by many as an expert in the VR industry. "Magic Edge," he told me, "looks to be one of the most promising VR entertainment startups in the industry." Indeed, when I spoke with Magic Edge Marketing Manager Ms. Leslie Lodestro, I got the impression that the company really has its act together. Founded in 1990 by Mr. Don Morris and Mr. Mike Chan, two very experienced high-tech executives, they are now very close to product launch.

The *Magic Edge™* concept is an LBE complex based on a teardrop-shaped capsule device on a unique motion platform. Up to six of these capsules can be networked together. An SGI Reality Engine controls the rendering of the 3D textured polygon graphics displayed on an internal high-resolution monitor. The capsule has a canopy top which pops open, and the interior has the look and feel of an aircraft cockpit — complete with joystick and a 4strap safety harness.

Ms. Lodestro told me that one of the key features of the Magic Edge capsule is its smooth motion system. They have taken a cantilevered approach, so the capsule looks like an egg on its side with the manipulator attached to its back. This gives the capsule a very fluid motion without bumps and jolts and a range of 45 degrees pitch up, 25 degrees down, and 60 degrees of roll to either side. She said that they soon expect to receive a patent for this innovative motion system.

The first experience that Magic Edge is rolling out for product introduction is an F-18 fighter pilot story. The pilot takes off from an aircraft carrier, goes after some ground targets, deals with a few enemy fighters, and can land back on the carrier or on a friendly runway after accomplishing the 20-minute mission. A huge variety of events can transpire based upon the pilot's actions. The networked system allows a team of pilots to work together or compete during a scenario. The pilots are in constant communication via a headset to the squadron leader; an attendant who coaches pilots along.

Magic Edge has a working prototype ready, and is proceeding as quickly as possible to opening its first entertainment complex, although the date and location are not yet determined. Ms. Lodestro also hinted that Magic Edge has a project in the works for a VR arcade product, which could be introduced before the end of the year.

MCA/Universal
Universal City, California, 818-777-1000

In his book *Virtual Reality: Through the New Looking Glass*, Mr. Kevin Teixeira detailed the virtual movies (or "voomies") project that MCA had going with VPL Research. Mr. Alex Singer, Creative Director of MCA's project, described his efforts: "Our plans call for two VR adventurers who have input on their own experience in the virtual world. Then there's an audience who has input on the experience and a show manager who has great control over the entire adventure to see that the show is interesting. All this gets combined into a huge number of variations for each experience, because the game itself introduces all sorts of characters and forces which are variables."

Well, with the recent demise of VPL, I speculate that the MCA project has been severely set back. Even after repeated phone calls to MCA I could not locate Mr. Alex Singer or anyone else working on any VR projects. I guess voomies will have to wait awhile.

MP Game Technology
Hunt Valley, Maryland, 410-771-0440

Until recently, MP Game Tech had been secretly working on some sort of VR entertainment system. In February, for undisclosed reasons, MPG management shut down the VR group. Software Engineer Mr. Michael McDonald was finally able to talk about what they had been doing.

The ambitious project was to be a large LBE complex for malls and similar venues, made up of 18 or more separate "stations" or "pods," each with an HMD or large-screen monitor (depending on the game). Multiple SGI Reality Engines on an Onyx platform would have handled all networking and graphics rendering, with separate computers for 3D sound,

digital I/O and other functions. MPG had prototypes built and operational, and was just two weeks away from formal demonstrations. They planned to open one or two facilities in 1993 and up to five more in 1994, charging \$6 a person for about 15 minutes of game time (not including mission training, debriefing, etc.). The VR development team was composed of MPG's top talent, including one of the best world-builders in the industry, according to Mr. McDonald. He was not able to say why the project was scrapped, but did tell me that work on the project may continue at some time in the future.

Namco-America
Santa Clara, California, 408-383-3900

Here's an exciting new game! Namco has just introduced *Galaxian 3™*, *Theater 6™* — a six-player virtual theater in which everyone has a battle station. The players, each in a laser-equipped cockpit, are arranged in a semicircle in front of a huge display, with two 110" screens sandwiched together about five feet away from them. Images displayed on the screen come from two laser disks, a group of graphics rendering engines, and a rear projection system. An excellent sound system completes the simulation.

Ms. Lucinda Bender, Marketing Administrator, explained the game to me. The theme is a space battle to save the Earth: "We're looking for the six greatest pilots," it says. The enemy is systematically destroying Earth's communication posts and a number of outposts have been lost. Now the enemy has built the "Cannon Seed;" a powerful destruction weapon pointed at Mother Earth. The player team starts out by blasting through some small ships, and then encounters some larger battleships (destroyed by seeking their power sources and firing on them). Finally the team must take on the Cannon Seed itself.

One system is now operational and can be played in San Francisco's Pier 39 CYBER STATION. Several more of these games will be imported from Japan soon. Namco also has a huge 28-player version which is equipped with motion feedback, too! Ms. Bender hinted that there would be more VR games coming in the next few years from Namco.

v.r.e. developers • at-a-glance •

This table identifies key players in the VR Entertainment industry. "Location-Based Entertainment" refers to a standalone entertainment center, based on a single coordinating theme and generally on one type of VR entertainment platform, such as **BattleTech™** or **Fightertown™**.

ARCADE WITH HMD

CyberZone
 StrayLight
 Virtual Images
 Visions of Reality
 W Industries
 XTAR

ARCADE WITHOUT HMD

Atari
 Dean Friedman Productions
 Namco-America
 SEGA Enterprises
 Vivid Group

LOCATION-BASED ENTERTAINMENT

Abrams-Gentile Entertainment
 Bullet-Proof Software
 Iwerks with Evans & Sutherland
 Horizon/Paramount/Spectrum HoloByte
 Hughes Training
 Kinney Aero
 Magic Edge
 Virtual World Entertainment Wintriss/
 Full Swing Golf/Access

NETWORK

AWH Video
 DP Research Corporation
 Shebute
 Sierra On-Line

HOME-BASED VR

Nintendo
 SEGA
 Spectrum HoloByte

PERSONAL COMPUTER

Ixion
 Origin

THEME PARKS

Chameleon

OTHERS TO WATCH

Alternate Worlds Technology
 Disney Imagineering
 IMAX
 Ride & Show Engineering

Nintendo of America
Redmond, Washington, 206-882-2040

Nintendo's success in home entertainment is nothing short of awesome. Since capturing market leadership in the mid-'80s it has enjoyed solid and growing sales even with the emergence of powerful competitors. With the development of VR, interactive entertainment is about to undergo a significant shift. Home systems will become available within the next five years which deliver quality VR and a fully-immersive HMD platform.

Nintendo is positioning itself for that future. Their new **Super FX™** chip, which vastly improves the graphics and speed capability of the Super Nintendo Entertainment System (SNES), uses RISC technology to deliver 3D polygon animation, object rotation and scaling, texture mapping, and light source shading. These chips, which are contained in the game cartridges rather than in the main console, are basically coprocessors with special graphics functionality.

Star Fox™, the first game to use FX technology, was released March 22. Nintendo describes the game as a flight of fantasy set in an action-packed science fiction world. Viewpoint is from behind or inside the player's supersonic aircraft. As "Fox McCloud," leader of a team of mercenary space pilots, the player is challenged to return peace to the Lylat system and save the planet from the evil Emperor Andross. Space battles are fought on each planet with skirmishes taking place in asteroid belts, meteor base and deep space.

I had the honor of talking with Mr. Llywelyn Graeme, who is most likely the greatest game player in the world. During his three years at Nintendo, he has played, solved, and memorized over 800 Nintendo games. He gave a very positive review of **Star Fox**, and lauds the extremely detailed graphics of the game because of the FX chip.

Corporate Communications Assistant Ms. Shannon Yost informed me that Nintendo has no immediate plans to offer an HMD system, but that they are monitoring the industry, and will move when the time is ripe.

Origin Systems
Austin, Texas, 512-335-5200

Origin, created by the brothers Garriott (Robert and Richard), has been one of the industry's most successful PC game companies. I remember Origin's first fantasy-adventure, **Ultima I**, from my Apple II+ days in high school. Today the **Ultima®** series is alive and well, and gets better with each sequel. Recently, **Ultima 7** hit the stands and quickly found its way into the waiting arms of PC gamers every-

Underworld
 features realistic
 motion and
 combat, sound
 and voices, and
 extensive
 interactivity. And
 it is really
 addictive!

where. The graphics are 3D, and the view is from the top, looking down at the characters in the scene.

In 1992, Origin developed and released a fantasy-adventure game with a different graphics style. **Ultima Underworld®** is a huge success and uses 3D polygon "firstperson" graphics to put the player inside the head of the game character, literally. Underworld features realistic motion and combat, sound and voices, and extensive interactivity. And it is really addictive! It took me over one hundred hours to complete the game, and I enjoyed every minute of it.

I asked Mr. Galen Svanas, Media Relations Manager, about the company's plans for VR. His response was immediate and enthusiastic. "We plan to add HMD

support to our games as soon as customers have them," he said. "We're planning to make **Ultima 10** our first fully-immersive VR game, but if our customers have high-resolution HMDs before then, perhaps **Ultima 8** or **9** will be immersive." He also told me about Origin's many other games including the new **Strike Commander®**, a realistic flight simulator modeled with Autodesk's **3D Studio™**, which would also be perfect for use with an HMD.

Origin, whose motto is "We Create Worlds®," considers itself to be an entertainment company and not just a software company, according to Mr. Svanas. The company is looking at various types of interactive entertainment as potential new business ventures. He told me about one activity that Mr. Richard Garriott, alias Lord British®, undertakes every other Halloween. His fantastic house is located on the highest point in Austin and is outfitted with a dungeon, hidden library, secret passages, and over \$250K of special effects. He turns his home into an interactive haunted house, and leads lucky guests through an **Ultima**-style full contact adventure inside the house and around three acres of land! Sounds great! Count me in for next time. I'll be happy to wait the five days it takes to get a ticket.

Ride & Show Engineering
San Dimas, California, 714-592-5575

Ride & Show is a producer of theme park rides. According to rumor, they have a VR entertainment project of some kind in the works. R&S were unavailable for comment, however.

SEGA Enterprises Inc., USA
Redwood City, California, 408-435-0201

This is the arcade coin-op division of SEGA. Western Regional Sales Manager Mr. Brian Copf told me that, while SEGA is definitely coming out with VR entertainment products, he couldn't tell me much that wasn't confidential. Their first product on the road to full immersive VR is **Virtua Racing™**; a deluxe sit-down driving game.

Virtua Racing uses SEGA's new custom graphics engine, called the CG board. It generates 180K polygons per second, and at the normal display frame rate of 30

frames per second, it allows a view of 6,000 polygons. Mr. Copf was obviously quite proud of this board, saying that it took SEGA's top engineers in Japan three years to develop.

Virtua Racing, which can be found in larger arcades, comes in two configurations: a networked version in which players race against each other, and a single-seater that comes equipped with pressure pads (these push against the driver during sharp turns to give a "g-force" effect). I've played both versions and can attest to the fun and addictive qualities of Virtua Racing!

SEGA's next product in the VR series will be introduced in the fall, and will incorporate texture mapping on the CG board. Mr. Copf says that this will probably also be a racing game of some sort. The company targets 1994 as the year it introduces an HMD-type game for full immersion.

SEGA of America

Redwood City, California, 415-508-2800

Big news here — really big. The new **Virtua Sega™ HMD**, a lightweight, full-color, stereo-optic helmet with 360-degree head tracking, will be on toy store shelves by Christmas. The price? Under \$200 retail. Wow! How can SEGA do it?

Many speculated on that very question at the VR Systems '93 conference. The price must allow incentive margins for retail stores and distribution channels, while still delivering enough profit to make the product worthwhile. From what we know about the costs of LCDs and head-tracking systems, that's quite a radical economy of scale.

According to *Computer Graphics World*, May 1992, Mattel sold more than 500,000 **Power Gloves™** in the first year after launch in 1989. SEGA may be using the sales performance of this peripheral as a benchmark for the potential of the Virtua HMD. Of course, the Power Glove cost about half as much as Virtua, but SEGA is offering something that Mattel did not: software. A large factor in the Power Glove's big slump in sales after its initial boom was the shortage of compelling games to go with it. SEGA, on the other hand, will release four VR games at the

same time it launches Virtua: flying, driving, shooting, and fantasy-action. With strong support by SEGA's third-party game partners, I suspect that there may be even more games available by Christmas.

How about performance? This is still unknown, but a recent issue of *Diehard Game Fan* magazine had a mini-review of Virtua. They tried it at an electronics show and described it as "Awesome Virtual Reality!" Ms. Haven Dubrul, SEGA's Virtua Product Manager, says that the

The Virtua Sega™ HMD: hundreds of thousands on the toy shelves by Christmas!



product will be on display at the June Consumer Electronics Show.

Shebute

New York, New York, 212-851-1507

Shebute™, which means "winds of truth in a time of change," is working on a networked VR edutainment system for children. Founder Mr. Ron Logsdon has been developing his concept for ten years, and hardware technology has recently reached a point where plans can be implemented. He's creating a huge informational system for world education and entertainment, which allows children of 13 years old and under to explore a never-ending virtual world. Here's the example Mr. Logsdon gave me:

"Imagine a child wandering through a virtual 'central park' in New York (perfectly safe, of course). The child explores

and learns. She sees a tree, and then a bird that sings sweetly. It interests her. She gives a command and immediately the statistics of the bird pop into view before her: species, history, place of origin, behavior, etc. She sees that the bird is from Brazil. 'Gee,' she says, 'I wonder what Brazil looks like?' With another command, she steps through a portal and into Brazil! Another new world to explore and learn in."

This is very much an "experiential hypertext" in which users can go from place to place on a whim. Mr. Logsdon's idea is to promote socially conscious, alternative games and learning experiences which teach kids how to ask the right questions, as opposed to merely teaching rote knowledge. "We view education as the fruit of technology," he explains. "Learning by experience is ten times better than seeing something on a screen." Mr. Logsdon estimates that his system will be ready for shipment in about 8-10 months.

Sierra On-Line

Oakhurst, California, 209-683-4468

Sierra's big project is **The Sierra Network®**; an immensely popular on-line graphical gaming network with over 20,000 members. In the basic gaming area, members can play card and board games against each other, participate in conferences, read bulletin boards, chat, and check their mailboxes. These features are included in TSN's basic membership price of \$12.95 per month. For an extra \$4 per month, members can buy access to **SierraLand™**, **MedievalLand™**, or **LarryLand™**.

SierraLand holds family arcade and action games like **Red Baron**, **PaintBall**, or **Minigolf**. MedievalLand is for fantasy fans. There, gamers battle dragons, demons, and evil spells in the dungeons of a medieval castle. LarryLand is the "Adults Only" service, where mature members can play blackjack, poker, slots, roulette, and socialize in the casino. Sierra has no immediate plans to integrate HMDs into these services, but they are watching the development of this technology closely. TSN offers a free trial membership (call 800-SIERRA-1).

SimGraphics Engineering
South Pasadena, California, 213-255-
0900

Founded in 1985, SimGraphics has become one of the most experienced and respected developers of real-time 3D graphics and VR/visual simulation software and systems. It provides a variety of consulting, design and development services to clients interested in customized graphics applications and products for engineering, training, and entertainment. SG has developed a number of unique devices for the VR industry, including the **Flying Mouse™**.

SG's latest innovation is VACS, the **VActor™ Animation Creation System**. What are VActors? VActors are "virtual actors;" computer generated characters or objects which are controlled by hidden actors in realtime. The actors wear interface devices for face, hands and body, allowing them to control the movements of these characters and objects. As the actor changes her facial position, the VActor's face changes in sync, morphing from one position to the other for smooth, realistic animation. The actors can see outside via a camera, and can therefore talk with others and respond to them in real time. (Just as if Nintendo's Mario was talking to you!)

One example of a VACS application, explained to me by Mr. Eric Finke of Iwerks, SimGraphics' marketing and distribution partner, might be the use of VActors in a theme park. In the most popular amusement parks, people have to wait in line. Boring! Enter VActors. These mascots would pop up on the monitor and entertain one waiting audience for a while, then pop off to amuse another crowd elsewhere in the theme park. The VActor can talk and joke with the audience and make the waiting time go by faster. Another application for VACS is to control the mascot of a professional sports team. In fact, a VActor is scheduled to appear on the big stadium screen during the April 2 Philadelphia 76'ers basketball game. Their mascot will interact with and pump-up the crowd.

Mr. Steve Glenn, VP of SimGraphics' Entertainment Group, is very excited about the potential for VACS as a stand-alone product for public entertainment as well as a tool for creating more realistic and entertaining VR. Look for VActors on a big-screen near you!

Spectrum HoloByte
Alameda, California, 510-522-3584

Spectrum is one of the most successful creators of computer games and simulations in the industry, having released numerous "blockbusters" such as the **Falcon®** flight simulator for PCs. Position-



The wildest-looking new product at the VR Systems '93 conference was StrayLight's **CyberTron™**. Participants scheduled playing time hours in advance.

ing itself perfectly for the future of computer entertainment, SH has a "Virtual Reality" software group of expert developers recruited from NASA and elsewhere, working with various partners. SH Chairman Mr. Gilman Louie, while obviously excited about these endeavors, is keeping pretty closed-mouthed about them in order to reduce public expectations and minimize hype. In fact, this is a stated goal of the **Star Trek®** partnership (SH, Horizon, & Paramount). Mr. Louie confidently told me: "We believe that there is entirely too much hype in the VR industry. We won't say much about

our products until they're released. After that, the proof is in the pudding."

That said, I did learn in general terms the nature of a few SH projects. Mr. Louie said that his company has been working in a close partnership with W Industries and Horizon Entertainment for approximately 3 years now to develop the American market for VR entertainment. SH most recently has been helping W Industries with "**Virtuality 2™**," a second-generation product which will have improved vision, faster computer performance, and a lighter headset, according to Mr. Louie.

The company is also working with other hardware manufacturers to develop VR home systems. Mr. Louie predicts that these early-technology systems will be released within 2 years and will be much better than the current offerings by SEGA and Nintendo. Looking beyond the mid-1990's, he believes that even higher-quality VR home systems will become available.

Spectrum HoloByte is working with the creative teams of **Star Trek®: The Next Generation™** and **Star Trek®: Deep Space Nine™** to create exciting experiences which stay true to the stories of these popular TV series. The VR technology allows players to be in the movie itself, says Mr. Louie. SH is building the software systems to control the worlds, player interaction, simulations and stories, and all other parts of the action.

StrayLight Corporation
Warren, New Jersey, 908-580-0086

By far the wildest-looking new product at the VR Systems '93 conference was StrayLight's **CyberTron™**. One glance at this huge gyroscope-shaped device is all that's needed for any VR enthusiast to ask "Where can I get a ticket?!!" Indeed, participants had to schedule playing time hours in advance.

StrayLight, one of the leading providers of VR software, is branching out to create end-user application systems for the entertainment and advertising industries, and has just introduced a VGA version of their popular **PhotoVR™**. Straylight is convinced that there is a close link be-

tween VR entertainment and advertising, and their strategy for the future is to take maximum advantage of this.

The CyberTron offers total immersion with stereoscopic vision, 3D sound, and motion. Its beautifully textured, high-speed graphics make it the most realistic VR entertainment world I have seen to date, and its color HMD, four-channel CD quality audio system and carefully balanced gyro mechanism combine to create an engrossing experience. Players confront numerous fast-paced game scenarios, each more challenging than the last, and must fly through obstacles, tunnels, and mazes while facing clever opponents, gathering treasures, and solving mysterious puzzles. CyberTron players navigate by maneuvering the gyro's position, and hold free-moving trigger devices which control their guns.

I played the game and spoke with StrayLight's President Mr. Tony Asch, who said that the system will soon be available for sale. Between now and then he will upgrade the HMD and put the finishing touches on the first game experience, which he describes as a "work in progress." He used the show as a market research opportunity and even modified the game in the evenings based on feedback from that day's show!

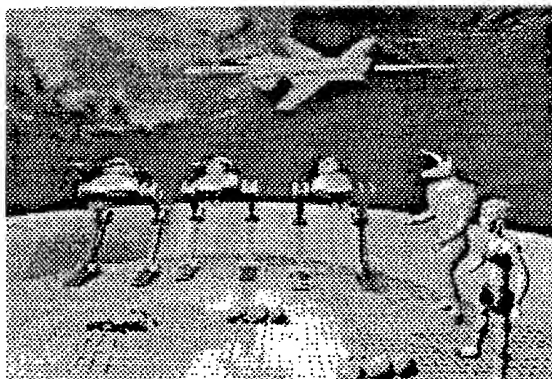
Trilobyte Software **Jacksonville, Oregon, 503-899-1113**

Trilobyte is a first-mover in interactive CD-ROM multimedia games. Their debut product *7th Guest*™ is a highly interactive and photorealistic game for the PC, scheduled to be released in mid-April. It combines live actors, computer renderings, and special effects in a story designed specifically to take advantage of the power of CDROM.

Mr. David Lumen, Manager of Software for *7th Guest*, informed me that the company has no current plans to develop HMD-based games for immersive VR, at least until HMDs hit the mass market.

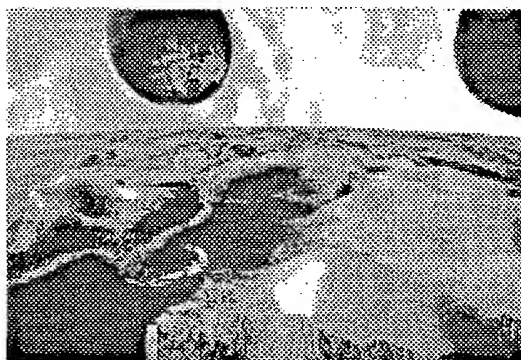
Twin Dolphin Games **Millpitas, California, 415-637-9300**

This startup company could be a solid candidate for VR entertainment for the future. Twin Dolphin™ is in the process of creating two PC games which could be on the shelves by Christmas. Mr. David Barbour of TDG describes the first as a



A view inside the world of Cybertron.

Windows wartime simulation game that looks down on realistic terrain from above. The second, of which Mr. Barbour is Lead Programmer, is a fantasy role-playing game called *Forgotten Castle*™; a real-time 3D-rendered world, heavy on



Cybertron landscape.

artwork, that a player can explore and interact with. The *Forgotten Castle* team is doing everything possible to create a visually interesting world, with both outdoor and indoor scenes, and high-quality monster animation.

While the team has no immediate plans for an HMD interface, the game would be

perfect for fully-immersive VR.

Virtual Images, Inc. **Columbus, Ohio, 614-459-0344**

At the recent VR Systems '93 Conference in New York City, an exciting new entertainment product was shown to the public for the first time: *Reality+*®. In this fully immersive system, multiple players explore a section of a futuristic city and fight using laser guns.

The *Reality+* system consists of an attractive all-black stand-up pod with lighted steps, the new HMD from Liquid Image Corp which provides monoscopic vision and 3D sound, a free floating grip to control the player's movement and laserfire, and a tall tower which houses the high performance computer system, speakers, and monitor. Systems can be networked together for multiplayer action.

The first game scenario features a street corner of a futuristic city block with several tall buildings, some of which have rooms which players can explore. On one of the largest buildings, a player can take an outside elevator to the roof but must be careful when walking close to the edge. One wrong step will send the player falling to her doom! Speeding air-cars travel the streets and target players with either laser-cannons or plain old hit-and-run tactics. Players score points by zapping these cars and each other while avoiding the lasers of both. I appreciated the great sound effects and smooth motion (generated by VI's proprietary rendering platform), and experienced a good feeling of 3D, even without stereoscopic vision.

Mr. Jeff Maresch, VI's Manager of Operations, said that VI has a different philosophy about computer entertainment than the traditional violent videogames in arcades today. They are focusing much more on the "exploration" aspect of VR, which Mr. Maresch believes will be much more attractive to female players, a long-neglected segment of the videogame market. VI plans to release a new game scenario every four

months, featuring entirely new concepts and virtual worlds. The company is currently working on texture mapping capability and anti-aliasing, and these features should be available for its games later this year.

Though VI cannot say where the first systems will be installed, these systems are available for sale to public entertainment facilities, with a six-week delivery time.

Virtual World Entertainment Chicago, Illinois, 312-243-6515

Most of you have undoubtedly heard about the **Battletech® Center** in Chicago. Virtual World Entertainment has done an excellent job of creating a "whole atmosphere" approach to location-based entertainment. The experience in the Battletech Center starts as soon as a player walks into the facility. Employees in official uniforms behave as if everything were completely real. Players begin with a training briefing and mission review video, then the group of six in the next mission enter their "Battlemech®" pods and start blasting away, either as individuals or as teams. Finally, players are debriefed and given a complete summary of the highlights of the battle, which shows who blasted who, what everyone's scores were, etc.

The Chicago facility opened in July 1990 and has sold over 350,000 tickets to date. No wonder that the company is beginning to expand to other cities around the world! Director of Communications Mr. Nick Morris says the Battletech Center is more popular than ever. VWE, under licensing arrangement with its partners, has opened a second facility in Yokohama, and a demonstrator facility in Tokyo. The second U.S. entertainment center opens in Los Angeles this summer, and three more will appear on the West Coast soon thereafter.

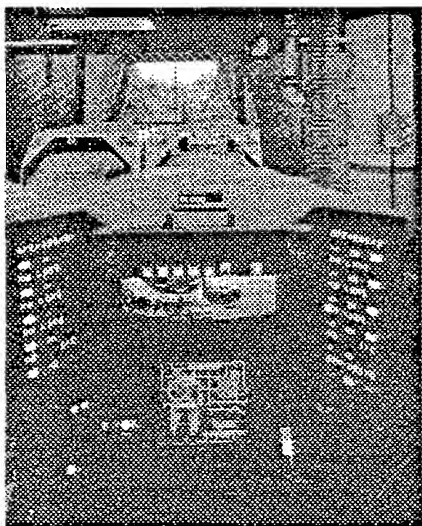
VWE is developing other simulations besides the "robot tank" scenario; players will soon be able to choose games from within their generic pods. Mr. Morris says that they will not sacrifice the realistic atmosphere of their facilities as these other games are introduced — they are committed to providing a complete entertainment experience, including train-

ing, briefing, mission review, etc. They are keeping a close watch on HMD technology, and may well integrate HMDs into their systems in the future.



From the cockpit of your BattleMech, you have more fire power than an entire battalion of 20th century tanks.

VWE's expansion plans have been given a recent boost by the equity investment of Mr. Tim Disney and his team of investors. Their investment is rumored to be



Launch into action from the inside of your BattleMech.

\$15M-\$20M for an undisclosed percentage of the equity. With this kind of might behind them, I expect VWE will be a future major player in the interactive en-

tertainment industry.

Visions of Reality Corporation South San Francisco, California, 415-615-9595

A major product launch is about to take place from the 1991 start-up, Visions of Reality Corporation. VOR recently announced an exclusive arrangement with Sense8 Corporation (Sausalito, CA) and Kaiser Electro-Optics (Carlsbad, CA) to use Sense8's WorldToolKit™ software and Kaiser's highquality HMD technology in the entertainment market. The result of this triple-threat is a very promising VR entertainment platform which, if all goes as planned, will quickly penetrate the U.S. and international entertainment mass-market.

I was lucky enough to see this product when I visited San Francisco last summer; it was very impressive even at its early stage of development. I played a networked tank game against my former boss of LEEP Systems, Mr. Eric Howlett. We battled furiously over the irregular terrain and obstacles. When we finished and came back into the reality of VOR's corporate offices, we were both severely battle-scarred, but happy. The prototypes we played were attractive sit-down kiosk units equipped with HMD and joystick.

VOR President Mr. Dan Rice informed me that his company will release this product, **Desert Storm II™**, and three other games, at the time of the official product launch (4th quarter of 1993). The games will be sold through normal videogame distributors to existing arcades and public entertainment centers, and Mr. Rice also plans to open his own VR entertainment centers, which will have as many as 30 VOR platforms at one location.

Players will have a number of games to choose from. Mr. Rice predicts at least five by the end of 1993, both singleplayer and multi-player. **Desert Storm II**, for example, can handle up to 15 players at once. VOR is developing some of these games, but they are also licensing, to third-party game developers, the right to create games for their hardware using Sense8's WTK. Mr. Kenneth Pimentel,

product manager at Sense8 and co-author of *Virtual Reality: Through the New Looking Glass*, says that several of Sense8's WTK customers are building games for the VOR platform.

Vivid Group

Toronto, Canada and San Francisco, California, 510-528-1967

Vivid's **Mandala®** system is a global success, with homes in museums and entertainment centers all around the world. Mandala's camera picks up the image of a person standing in front of a blue screen, and places that person into a computer generated environment. She can interact by moving and touching objects in the virtual world.

A famous example of Mandala's use in entertainment is the **Star Trek® Virtual Reality Transporter Experience** that is on a 3-year tour of major American cities. Visitors step into a physical recreation of Star Trek's Transporter room. Groups of participants are greeted by the Ship's computer and invited onto the transporter platform. Once there they see themselves on a large video screen in front of them, ready to beam to a variety of interactive Star Trek experiences.

The Mandala System goes into transport mode and "beams out" the images of the participants. They are then "beamed down" to a new world where they can interact with virtual images surrounding them. For example, Ship's Holodeck visitors are immersed in the heart of a virtual jungle, amidst an array of flora and fauna which react when touched.

The Mandala System is integral to Nickelodeon's **Nick Arcade** childrens' game show, and is used in many other entertainment applications. Vivid's Ms. Susan Wyshynski, who recently relocated to San Francisco to develop products, told me about their most recent efforts: a highperformance system for sale to arcades and a low-cost system for the home. The home unit uses inexpensive CCD camera chip technology and a custom designed interface, resulting in an affordable \$100 add-on to a SEGA or Nintendo game. Vivid plans to create the first three specialized Mandala games, for both arcade and home systems.

W Industries

Leicester, England, 44-(0)53-354-2127

When asked "Which company is the leader and pioneer in VR entertainment?" any industry insider will invariably say "W Industries." Due to the concerted efforts of CEO Dr. Jonathan Waldern and his team of talented developers and marketers, WI has a giant lead in the VR entertainment market. Their first entertainment system **Virtuality™** was released in 1991. While others have

When asked
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Industries."

struggled to bring competing systems to market, WI has sailed out in front, selling 280 of their beautifully designed units throughout the world. They have been aided by their distribution partners, including the U.S. firm Horizon Entertainment.

The Virtuality simulator, aptly called the world's first VR entertainment system, comes in stand-up or sit-down units, has options for many games (the most popular of which is the first: **Dactyl Nightmare™**), and features total immersion and networked interactivity and competition. "This product thus far has been a great success for the company," says Mr. John Tweedy, Business Development Director. "We are now a profitable trading concern. Last year's operations were very profitable and so far, this year's

sales have exceeded projections." The company now employs 56 people, up from 18 at this time last year.

So, what's next for WI? **Virtuality 2™**! For the last year and a half WI has been researching and developing its second-generation product, which will feature reductions in cost and weight, increases in resolution and processing power, and major enhancements in motion tracking. Mr. Tweedy told me that WI is readily capable of producing this product now, but for strategic reasons it is delaying the timing of the launch.

The rational development of the VR entertainment market is a big concern to WI. The company is very sensitive to the public's lack of information about VR, and feels that it has a responsibility to inform the market in a credible manner, setting and managing expectation levels to control hype. So far WI has satisfied early adopters, but now they're looking at mainstream entertainment and industrial applications, including a "Virtual Office" VR communications system. WI has several non-entertainment projects in the works, mostly custom VR systems for companies throughout the world.

**Wintriss Engineering, Full Swing Golf, Access Software
San Diego, California and Salt Lake City, Utah, 619-4670831**

These three companies have come together to create the latest in indoor golf simulators. The product was funded and is marketed by Full Swing Golf, the hardware was designed and built by Wintriss Engineering, and the software was created by Access Software, developers of the hot PC golf game **LINKS 386 Pro**.

Described as the Lamborghini of golf simulators, the system has a 6x12' screen which displays an extremely accurate view of any one of a number of top golf courses. Instead of the photographs that are displayed on the screens of other simulators, this system uses a virtual world. Each view is independently generated from the database, thus qualifying the system for the label "VR." The Wintriss hardware picks up the velocity, spin and trajectory of the ball and calculates its flight to within a few feet of where it would have gone in reality, ac-

according to Mr. Chris Kiraly, Wintriss' Vice President of Engineering. The computer contains a highly accurate database of the course and knows every bit of its topography, every tree, bush, and sand trap. The computer can calculate uphill and downhill rolls, collisions with hazards, etc. Access has even implemented bird chirps and wind sounds to add to the experience.

Ms. Stephanie Rea, Wintriss' Business Manager, tells me that several systems have been installed on the West Coast, a number in Georgia and Ohio, and many more in Asia. Judging by the initial popularity of these systems, we won't have to wait long before they appear in most major cities.

XTAR Electronics San Diego, California, 619-271-4440

XTAR™ is in final development with a new HMD-type VR entertainment product. The system features a flight simulation game called **NightFighter™**, on a motion platform. My conversation with Sales Director Mr. Bob Beken left me very curious about XTAR's product. When asked what the system looked like, he responded, "Like the Momma Insect from Aliens." Wow! A player straps into a 5point harness and puts on the HMD. She then enters a virtual world with a flight-combat theme: two groups of fighters go at it in a heated battle, thousands of feet in the air.

The system is mounted on a motion platform with a 75-degree pitch range (up/down), and an unlimited spin/roll range (left/right at 60 rpm). The player sits in a vibrating "GSeat," and air bags apply pressure to the body which corresponds to the perceived motion of the plane. All this, combined with a very high-performance graphics computer, full Doppler sound, and lots of added depth cues, create an exciting combat simulation experience. Ten skill levels allow a pilot to just "toddle through the sky" or "yell, God help me," according to Mr. Beken.

The system will be exhibited soon at a conference in Holland, and at the next IAAPA (International Association of Amusement Parks and Attractions) show in the United States. Δ

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ABOUT THE AUTHOR

Randy Sprout is a VR Entertainment enthusiast who would like all these developers to hurry up so he can play their games. He has worked in the past for Boston-based HMD manufacturer **LEEP Systems**, assisting with marketing and product development for an entertainment product. His first PIX article (Vol 1, Issue 4) described an adventurous day at LEEP. Randy has worked for a number of years as an electrical engineer, and is currently finishing his MBA at the Harvard Business School.

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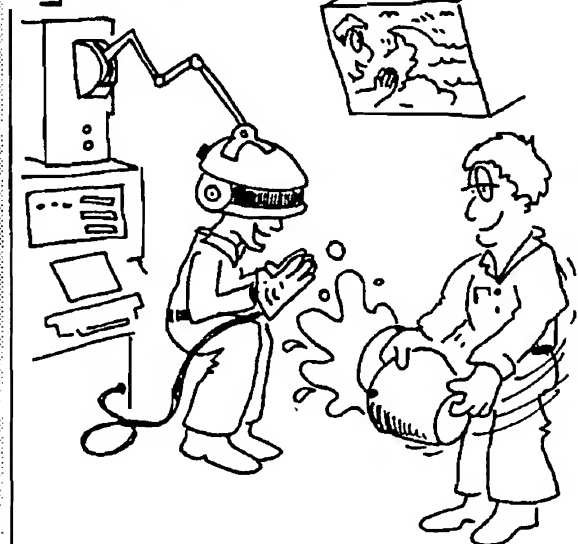
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THANKS

In concluding, I'd like to express my sincere thanks to everyone who helped and contributed to this effort. Certainly, everyone mentioned above was instrumental in the creation of this report. In addition I'd like to thank Karin August - supreme leader of VRASP, Nick Edgington, Duncan McElroy, Tom Hagan, Gregorio Rivera, Eric Howlett and Ulrich Figge at LEEP Systems, Jim Cash, John Kao, Mark Pflaging, Janet "Zyzy" Galore, Tod Foley - our extremely talented and demanding editor, Benn Konsynski, Eben Gay and Paul Matthews of the BCS VR Group, Charles Cook at the Berkeley Underground, Kenneth Pimentel at Sense8, Joanne Donovan, Rod Recker at Lightscape Graphics Software, Ramy Sayah at Atari, Becky Filkins at Horizon, Scott Redmond, Bob Jacobson at Worldesign, Jerry Isdale, Mark DeLoura at sci.virtual-worlds, Kevin Teixeira at Intel, Steve Glenn at SimGraphics, John Latta at 4th Wave, David Frerichs, Greg Klein at Spectrum Dynamics, and the gang at Visions of Reality. You all helped immensely!

— R.S.

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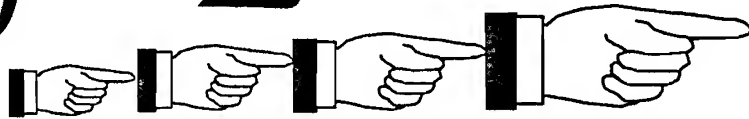
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Glove Letters



Glove letters: a bimonthly column of letters from actual readers, offering advice, perspectives, and comments concerning relevant topics. Want to email Glovey? Here's the internet address... "glovvy_lover@vpl.nintendo.exos.hot_date" (or write in care of the publisher). The names of all correspondents are kept confidential.

Dear Glovey,

Though my date with the Princeton Engine was colder than Gibsonian ice, I could not give up hope. I drove up through the campus, telling myself, "Nica, this town is full of smart, powerful beings! Surely, it's just a matter of finding the right connectors." So I dropped by the best pizza in town, Teresa's Ristorante, for a recuperative slice and to drown my frustrations in *Pellegrino*. I sat at the bar dripping mozzarella on my Mondo, occasionally lapsing into the lyrical refrains of "VREAM Lover" by Bobby Darin.

Suddenly out of the corner of my eye, I saw a tall dark haired preppy sit down next to me. Porting a Crouch & Fitzgerald attache case in one hand and an issue of *WIRED* in the other, I figured this was just a common Princetonian, so I ignored him. He put away the 'zine and pulled out an issue of *PIX-Elation*. Aha! Now, my curiosity was piqued. I judged his hands. Yes, clearly there were nascent signs of carpal tunnel syndrome. Good. I activated my tracking system.

"Been in any good simulations lately?" I inquired coyly.

"No. Have you?"

"No."

"M2."

"Friend's copy."

"Of course. My name is Sengore."

"I'm Teledildonica."

"Actually, I'm doing research for a pater-

nity suit. My firm has been retained to look at source code named in the case."

"Interesting. There's been a lot of talk lately whether DNA is proprietary information."

"Well, at least VPL doesn't have that patent!"

We both laughed. It was akin to simulator sickness, finding a kindred soul.

Anyway, Glovey, I just wanted to give you a status report on my excursion to Princeton. I'll let you know how the story goes in my next missive.

- Nica

Naughty Nica!

Haven't you heard about VR-VD? How can you so cavalierly gad about such a rampaging poly town as Princeton? Just because they don't have an Institute of Technology, doesn't mean you are safe. PC viruses are nothing compared to it. Remember, when you interface with a system, you interface with every system it's ever interfaced with. (Your mother bribed me with a stacker to say that to you.) I'll dream about the next installment of 'Nica's 'Nother World.

* * *

Whoa Glovey,

Like, I'm at the New York VR Systems conference. There's this funky gray play toy on my hand, right? I look at the screen and it's my hand in a 3D computer drawing! So I tell the guy, show me something new and mondo. Another goofy glove goes on his hand and now he's in there too! We're side-by-side, gawking at our two virtual hands. I'm thinking maybe I could hock my Mazeratti to get the bucks for this thing, but he says it's cheap! I know you're always gabbin' about weird stuff like this so here's my letter. How much moolah do I get if you publish it? Hey, I'm an artist, man. Don't got much

time fer unpaid scribbling. Have you seen the abandoned warehouse on K and 12th in the District? That's MINE! I did that! "Make glove not war"; "Digitize don't criticize"; "Don't let them ... [words smudged by funny smelling stain]"

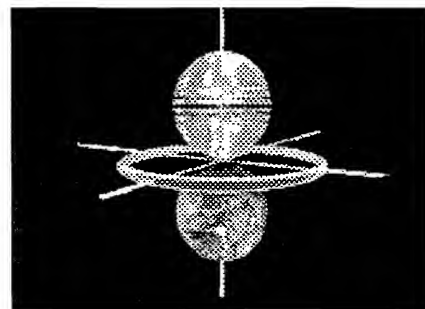
- Jack Head

Dear Mr. Head,

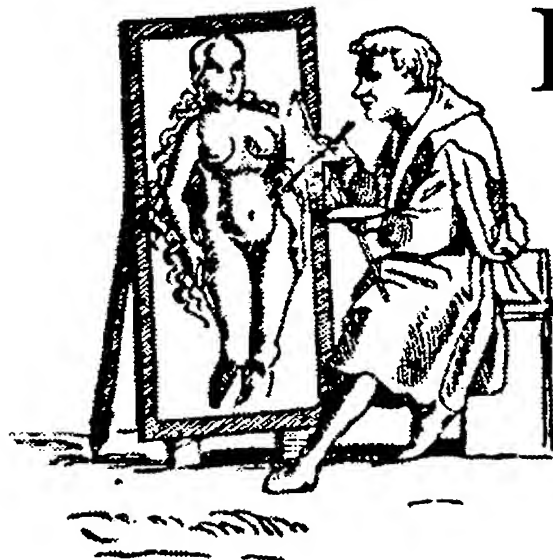
Money? Who do you think I am, Bill Gates? Sorry, but we have no yen for you. Call Domain Simulations, maybe Jaron will commission you to do his next album cover. In case anyone else is reading, I should point out that it is now possible to interface two Power Gloves to a PC. The booth Jack mentioned was in fact VRASP's! The VRASP PC-Based VR Glove Workshop at the upcoming IEEE Electro conference will discuss how to connect two gloves. In addition, cables will be offered for connecting two gloves to one parallel port.

As long as we're on the subject, since the PC can now support two gloves, wouldn't it make sense to have a left-handed glove in addition to the right-handed one? The software could be changed to show either two rights, or a left and a right hand. Only problem is Mattel never made any left handed gloves! Some of my hacker friends decided they could fix that, and so I can tell you definitively that you can presently use both hands in rend386 or o2glove. Since hackers hate documenting, a step-by-step for building the left-handed glove will not be available until the workshop.

— Glovey.



V • R • A • S • P



PAINTING THE FUTURE

Some Remarks following the *Interval Research*
Brainstorming Session of 7 May 1992

by Rob Tow

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Notes on the Essay *Painting the Future*

This essay was written before I was hired by Interval Research Corporation last summer, and reflects my personal thinking at that time. Certain elements have evolved since then; in particular, Brenda Laurel (who occupies the office next to mine at Interval) has convinced me that the softness of personal representation achievable in VR and related cyberspaces is of great import. I have publicly confessed my error, and am currently codifying my thoughts on this point in a new essay: *Doctor Red: How I Learned to Stop Worrying and Love VR*.

The "painter" is from Erasmus' *In Praise of Folly*; the inventor & proto-helicopter is from a 19th century *Scientific American* issue; the pointing hand is a self portrait; the press is by Dürer (and is the oldest known depiction of a printing press); the face is Isaac Newton; Paul Allen (the *other* Microsoft billionaire) is the patron of Interval Research Corporation... and while at Xerox PARC I invented the core digital storage technology of Smart Paper™ and Glyph™. —R—

Portrait of a future that we *want* to live in—New technologies, new tools, new wealth—Visions of future computing: ubiquitous *vs.* nomadic *vs.* universal computing & virtual reality *vs.* augmented reality—*The future's so bright, I gotta wear (data)shades*—Zen and the art of user interface—The evolution of technology—The role of the individual—Lessons from documents: fax, desktop publishing, email, & smart-paper—Future phenomenology—What is to Be Done

The world in which we wish to live is that of triumphant science employed for the betterment of mankind. This ideal has its roots in the vision of René Descartes and Francis Bacon, and has changed but little in its essentials since the seventeenth century—when Bacon observed that "no empire, no sect, no star seems to have exerted greater power and influence in human affairs" than the three "mechanical discoveries" of printing, gunpowder, and the compass. He sketched a program designed to "subdue and overcome the necessities and miseries of humanity", based on technology. This is still the hopeful vision of scientific humanists.

Now the new "mechanical discoveries" of computers, video, and instant communication are changing the world. Certain trends involving these technologies may be easily extrapolated by anyone equipped with log graph paper—there's at least two decades of dependable decline ahead in price and increase in power in conventional silicon fabrication and communications technologies.

Lately, an empire has dissolved under their influence.

New knowledge, new technologies—new tools and instrumentalities for scientists, engineers, *and artists*—create new wealth. They do so more than does labor. For example, bauxite ore is just a heap of rocks... unless one knows the details of the Hall process for smelting aluminum—then it may be transformed, perhaps into pots—or airplane wings. This points a way out of the limits to growth, out of the zero-sum games, out of the Malthusian competition. *This is where Marx got it deeply wrong.*

By the end of the century half the world's population will be under the age of twenty. Aggressively moving forward with technology will be the only way to avoid collapse. Even so, it's going to be pretty rough going as we enter the next millennium.

An important element of the basic world view expressed in the work done by all of us is an emphasis on the individual person—on empowering individuals, with access to knowledge, personal computing, publishing, and communication technologies.

Today there are five main visions of the future of computing. They each make profoundly different statements about the individual and the group.

Ubiquitous computing—Mark Weiser's vision—involves living in an architecture that, like classical architecture, defines the relation of the individual to the group by defining space, in the context of a building. In such a building there are many displays, flat panels—several megapixel displays, tens of smaller screens, and hundreds of “post-it” sized displays per person. All are linked into the Net. One wanders through rooms and halls, tracked by the computer architecture by wearing an active badge that signals one's presence. Your user interface travels along with you, flitting from screen to screen. In Weiser's vision *space* becomes intertwined with *cyberspace*, and *building architecture* merges with *computer architecture*. It's Apollonian computing... philosopher kings engaged in discourse, strolling through serene columns that are the forest tree trunks of an information ecology, the opposite of Plato's cave.

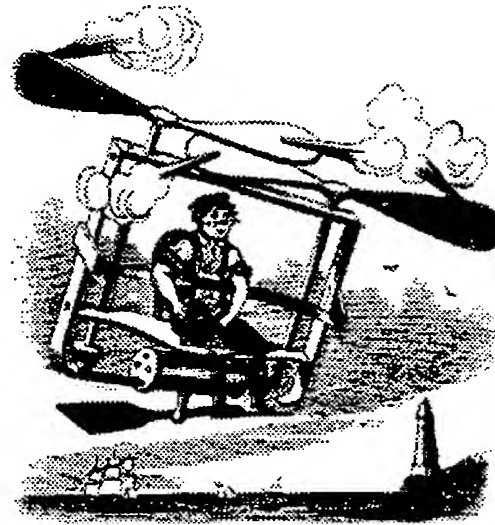
Nomadic computing—currently expressed by the laptop with a fax/data modem—is the vision of a person roaming, equipped with a personal computer, independent of externals, yet able to tap telecommunications to access remote resources—again, a definition of space, of architecture, and of the relationship of the individual and society. Xerox's *PaperWorks™* fax control software is the latest enabling step in this vision. The near future holds the promise of a wallet sized “personal data assistant” that combines all of the functionality of computer, fax, phone, and net access. It's wonderfully American West—*cowboy computing*.

Universal computing—the nanotech dreams of Eric Drexler and Ralph Merkle—aims nothing less than complete transformation of reality from atoms on up. By making self-replicating molecular computing devices—by imposing a new level of information flow upon physics, on to the low level organization of matter and energy—literally everything will become part of the computing universe. The individual ultimately dissolves into the infosphere—*uploads*—producing the most radical redefinition of space, of architecture, and of the relationship of the individual and society. The nanos talk of the *historical singularity*—the time in the future beyond which no meaningful predictions can possibly be made because so much changes. Some put it as close as fifty years from now. The dark side of their vision is *gray goo*—the molecular dissolution of the biosphere by programmed self-replicating molecular machines that transform everything into copies of themselves. The bright side is expressed by the nanos and their close cousins the cryos—the physical resurrection of the body, physical immortality, achievable now by one way time travel into the future via cryonics... frozen corpsicles awaiting medical nanomachines that rebuild and reconstitute. Curiously, the nanos abhor quantum mechanics, and construct paper models of mechanical molecular Babbage machines, reflecting an overly deterministic reductionism.

Virtual reality—Jaron Lanier's “post-symbolic” synthetic replacement of the sensorium—is the ultimate escapist trip. Some proclaim it to be “better than acid”. It finds its trivialization in cybersex—*teledildonics*. An early commercial application is in commercial architecture—the designer and customer can walk through buildings, with the sun angle and weather dialed in, experiencing views derived from computer models. Culturally, it's hot—it's on CNN, there's a cult movie (*Lawnmower Man*)... you can go to a San Francisco house party (“rave”), take some choline laced “smart drinks”, put on a VR helmet and a dataglove... and fly away through virtual walls with the point of a finger.

Augmented reality—fighter pilots get this from their heads-up display—overlays the normal sensorium with additional inputs, expanding the experience of external reality. An architect might experience this by wearing *datashades*—light weight head mounted displays with cameras mounted on them—walking into a room he might see a representation of the buildings wiring overlaid within his view of the walls... or a surgeon might see “into” a patient

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while operating. A popular song of the eighties proclaimed "*the future's so bright, I gotta wear shades*"—by the end of the nineties advances in display technology, taking advantage of VLSI binary optics, will make cheap light weight datashades a reality. Datashades, using eye tracking and eye blinks as the primary interface, will enable people to augment reality while walking, bicycling... even skiing.



"Virtual reality" is like Hindu meditation, trancing into an illusion; "augmented reality" is more like Zen—a more profound immersion in the world. "Post-symbolic" computing smacks of the "paperless office"—just as there's now more *paper* than ever before, in the future there will be more *symbols* than before—richer symbols, communicating to more sophisticated people. Video as a first class data structure is inherent in both, and both will introduce *dynamics* (simulated physics) into user interfaces. Dynamics may ape the physical world—or follow the "laws" of magic (contagion, contiguity, similarity). Augmented reality will be richer and more expressive than "real" reality.

The real future will see all five of these visions intermingled. *All of them are closer to robust realization than most people appreciate.*

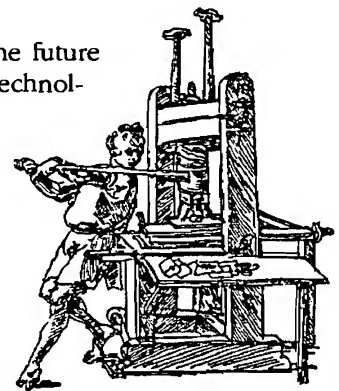
New technologies arise from earlier ones, in a fashion reminiscent of biological evolution. There are times of rapid change from a small ancestral stock, followed by smooth radiation and diversity through an ecology—*punctuated equilibrium*. The eighties saw such a evolutionary radiation out from innovations made at Xerox PARC—the personal computer, the desktop metaphor, laser printing; and the local area network.

Shortly, a new radiation will begin, from the five wellsprings identified above.

Individuals make a difference at these times of key innovation. It's important to realize that the same basic technology may be expressed in very different ways—much as is seen in the architecture of buildings—defining/enabling/limiting the individual and the group. When the major innovators of a technology *design* they may influence a school, a generation, a society. Their design is the original mutation, the primeval stock—Lucy walking the veldt. Part of the challenge for technologists is exactly this opportunity. The same skills of design and architecture may be expressed to give the vast cubie land of Hewlett-Packard or the individual offices of Microsoft or PARC. Similar choices abound in the design of computer and communications systems.

The other side of the duality of the individual in this context is found in the opportunity to place humanity—in the form of the individual—back into the center of the universe/infosphere, from which it has been cast out since the Renaissance.

All of this is seen in miniature in the history of documents, pointing the way of the future of other technologies. Gutenberg innovated a robust *mass production* document technology. They became cheap and identical. *Newspapers* became possible—access to basic information increased tremendously, with the standard delay of news transmission dramatically chopped—with great social impact.[†] Lately, a new innovation in printing has been made—the introduction of digital data embedded within the marks, images, and glyphs on paper, below the limits of sensible perception. This makes the visible appearance of paper documents the tip of an iceberg—most of the substance is below the surface, a frozen snapshot of a Turing-complete process. This "*smart paper*" is the first major change in the basic nature of printed documents since Gutenberg—fax machines and laser printers are elaborations of his vision, not changes.



There are things that are deeply right about fax. Its success stands in stark contrast to the vision of many at the start of the eighties—structured document interchange. Rather than intelligent editors and formats, building on the

[†]In Paris following the Revolution there were over *five hundred* newspapers (and a literacy rate of 93%). Astonishing, but true—for an account of the pivotal role of printing in the French Revolution see Simon Schama's *Citizens: a Chronicle of the French Revolution*. Lenin's counterview of the importance of central control of the press may be found in his essay *What Is to Be Done*.

success of Arpanet's email, we find at the end of the decade in Silicon Valley thousands of resumes faxing into digital stores, dumped into OCR software, ending in databases accessed by keyword search. Fax has an appealing *physicality*—you can scribble on it, and transmit the scribbles—and makes the simple pixel map a first class data structure.



Video is following fast along the same route, with personal video looming large in the contemporary social, legal, and political scene. Our notions of privacy will never be same once video cameras shrink to buttons, and are worn as clothing by those who are into ubiquitous self-bugging.

All of this has the potential to change the human condition, all the way down to phenomenology. "Reality" is a slippery concept... and is definitely constructive. It is built from the confluence of experience, wiring, and input (at least). It is not "external", as Locke would have it. Altering the input—particularly before the age of ~7, while the wiring of the brain is still evolving—definitely changes reality. Consider cats raised in an environment consisting only of vertical lines: they lack the cortical wiring to "see" horizontal stripes. The latter simply *do not exist* to the cat raised in such a deprived environment. Now consider that we were wired in a deprived sensory environment, compared to what children twenty years from now will experience routinely, in play, in virtual and augmented reality. They may well perceive things we never will.

So, what is to be done? Paul Allen has expressed a desire to give back to society such underpinnings as he stood upon to make his fortune and change the world. This echoes the words of Newton, when he remarked that if he had seen farther that it was because he stood on the shoulders of giants. His challenge is to gather together, use the resources he provides, and to invent the future—in the spirit of a new Enlightenment that enriches and betters us and our children. *The key is to make a difference that makes a difference.*



Home Media: Forget Your TV and Stereo

Douglas Faxon

VR as Entertainment was the conceptual keynote at this year's **Home Media Expo** in Beverly Hills, California. Finally the VR and Mass-Media Arts industries are getting together! VRASpian and composer/musician Douglas Faxon was there to check out the gig, and comes back with mucho good news. What's next — "I want my MVR?" —TF.

Los Angeles was as beautiful as it gets at the Home Media Expo in March. Sustained recent rains made the normally dry and brown Southland a verdant green, which improved my attitude a whole bunch. And the sub-compact rental car I'd reserved by phone turned out to be a brand-new Dodge Dynasty, a car made in the U.S. which can take collisions with comfort and probably even deflect a bullet or two, although I didn't have occasion to experience either situation during my brief visit.

Wednesday morning found me in the

Beverly Hilton Hotel lobby area, trying to get my bearings and looking for the room where TV Answer was to give their presentation. And quite a presentation it was, too. Television is about to become interactive, folks. Good news for people who have always wanted more from this appliance; bad news for couch potatoes and channel-surfers. TV Answer's box hooks up like a cable box, but its signal comes from space, not from the cable itself.

A cellular-phone-style antenna on the back of the unit transmits and receives signals

from a local cell, which gets its signals from a satellite controlled from TVA's hub site in Reston, Virginia. The system overlays an icon-based image that you control and interact with via an ergonomic remote with a trackball. Among the features that will be available with this box are: the ability to play along with game shows and sporting events, an online TV guide which can program your VCR with the shows you want to tape, pizza-ordering without going to the phone, and entering your opinion in political debates (shades of Perot's "electronic Town Hall!").

New Uses, New Muses

At the Recording Artist and Producer's Roundtable, a prestigious panel talked about interactivity in media and its effects on the video/record industry. Thomas Dolby talked about his new company, Head Space, which will connect musicians interested in composing for multimedia with software companies. He's also working on a VR project that will be coming to the Guggenheim Museum soon. Edgar Winter didn't say much, but talked a little bit about digital recording technology. Todd Rundgren, eager to avoid taking too much time away from the other speakers by getting up on his "soapbox," also avoided talking about his upcoming Phillips CD-I production, "No World Order". He did respond to a question about 3D audio by saying he wasn't interested in it until the technology becomes viable for consumers to use, and also that his emphasis is more on the content of the work as opposed to the techniques used in its creation.

Michael Penn talked a bit about 3D audio, saying that he used Q-Sound in the production of his latest release. Steve Nelson, who works with Peter Gabriel, took us on a journey through Gabriel's new CD-I release (still under construction). This production will allow viewers to get a video "window" on various aspects of Gabriel's work, his life and his work with ethnic artists by clicking on various areas on the screen. This disk is really something. I was impressed with the amount and diversity of information contained within. Nelson also noted that the record labels are hesitant at present to distribute CD-I products, adding that he felt that attitude will probably soon turn around.

Phil Van Allen showed us a bit of U2's "ZooTV" interactive disk. Last but not least, Tim Byers of Motley Crue showed us their opus in the digital domain, a video retrospective covering the band's music and videos from their early days on. I noticed the other panelists smirking during this presentation; and I too was sur-

prised that Motley Crue are among the first artists working in this medium.

Dr. Tim Leary moderated the Entertainment Artist's Roundtable with his usual flair for humor. Among the panelists were Allee Willis (Grammy-winning film-maker & songwriter), CoCo Conn (artist involved with SigKids of Siggraph), Joe Ito of Neotony, and Jas Morgan of Mondo 2000. Allee Willis spoke animatedly about the changing entertainment world, noting that this is the first time in Hollywood where the future is uncertain — the market is wide open due to new technologies and new types of art and entertainment. She's looking forward to stirring things up in her inimitable fashion. CoCo Conn showed some video footage from last year's Siggraph convention, where groups of kids banded together to work on various

"...this is the first time in
Hollywood where the
future is uncertain..."

high-tech projects like shooting a video and making a scanner out of Legos. Wish this kind of fun was around when I was a kid! Joe Ito showed us footage from an interactive TV show for kids in Japan that has many VR elements, as well as some wild, psychedelic graphics. Maybe "Sesame Street" should join the 90's and become more like this show... Very stimulating. Jas Morgan shared his stories about the Mondo article they did for Time magazine a few months back, as well as a humorous but surreal story about the state of computer technology in our nation's capital.

Audio, Video, 3DO!

3DO gave their presentation Wednesday afternoon in the International Ballroom. This was the first I'd seen about 3DO's technology, and I was impressed. The video they showed to demonstrate the capabilities of their box was awesome, at least to a guy who spends so much time

waiting for his Vistapro landscapes to render on his PC. Fast full-screen video processing is just around the corner, although whether this platform will be usable for VR is another question. I never once got close enough to anyone at their table to ask about this; there were so many people around them all through the show (mostly aggressive men in expensive suits) that I figured I'd wait till I got home and just call them. More info on developing software for this platform will be forthcoming.

Location-Based Entertainment 101

Of particular interest to the VRASP community were the two lectures I attended the last day of the show. The first, "Virtual Reality as Entertainment", began with a report/commentary by Marty Perlmutter, which was an overview of a lot of directions and developments of VR tech. He mentioned a company who "has CMOS technology for slicing wafers into sun-glass frames that are high-definition TV screens." He also sees large flash memories — to the tune of one gig — replacing CD-ROM retrieval systems in the near future.

Diana Hawkins of Interactive Associates gave an extremely condensed ten minute talk centering on location-based VR, a sort of "LBE 101" which covered a lot of ground in a short amount of time. Discussing the pros and cons of passive simulations (motion-based film theaters, like at Disneyland and Universal) and active simulations (full-immersion VR and vehicle-based VR like Battletech), she summed up by recommending that VR sites incorporate a bit of each type of technology into various attractions along with food, beverage and merchandise in a themed environment with changing software. She specifically mentioned the distinct lack of non-shoot-em-up software and the need to consider the female gender's needs when developing software for these sites. This brought strong applause from the predominantly male audience, which I took as a good sign.

Next up was Gilman Louie from Spectrum Holobyte, creators of popular software games including Tetris and Wordtris. His company is currently involved in the development of Paramount's "Star Trek" LBE centers, of which he couldn't give further details. He placed particular emphasis on VR as a way of bringing people together, across great distances over VR networks. His vision for VR puts quality software in a unified system which emphasizes environment; supporting stories and simulations rather than scripts (as in movies), giving the feeling of being "in" the game versus "in front of" it. He closed with a story about his experience of Simnet at Fort Knox in which 400 people were linked together (at different bases around the world) via Simnet in a joint training exercise! His hope is that we can find more productive and educational uses for this type of technology. Simgraphics' Steve Glenn was next with a slide show as well as video footage demonstrating their "Face Waldo" in action. Very impressive! He pointed out for the TV and movie industry audience that their technology, as powerful and useful as it is, is not a replacement for traditional animation, but a labor-and-time saving device. Stan Kinsey of Iwerks Entertainment discussed LBEs and showed a video promo of "Cinetropolis," a movie-based simulation with moving seats and a 360-degree screen, built within a theme-based complex, complete with merchandising and restaurants. Thematic updates will occur periodically to keep the experience fresh and keep people coming back.

Sound Visions for VR-tlists

Greg Panos is involved in the "VR Startup Kit" CD-ROM, which is due to be released at the summer CES, and will contain lots of VR-related software and advertisements from VR-related companies (PC-based, retail price around \$40.00). "Persona Form" is another project Greg is involved in, and this one sounds as if it will be pushing the outside of the envelope in VR. The project will be attempting to

archive and simulate real people via the use of virtual actors (or Vactors). Famous people will create digital archives of themselves as virtual characters. Thomas Dolby was the last speaker on the panel, and spoke about his non-violent VR program due to be shown at the Guggenheim Museum (funded by INTEL). This exhibit will be driven by a 486 PC with a Fireboard i860 card and Alesis ADAT driving the sound. He emphasized the audio aspect of VR and its importance in creating a convincing VR environment. He plugged the Crystal Rivers Beachtron, as well as the Gravis and Logitech 3D sound systems, which will provide 16-bit sound with 3D sound localization for under \$200.

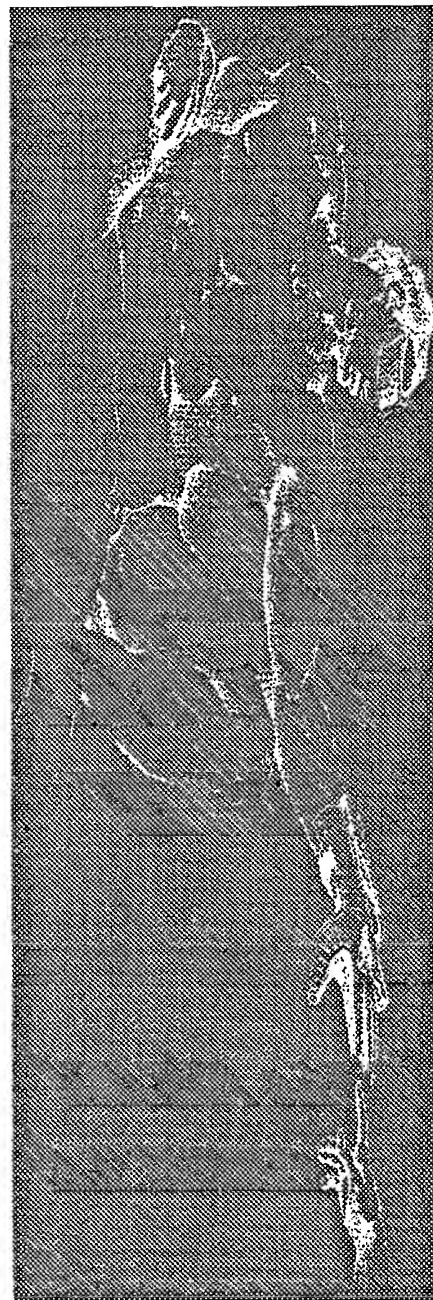
[Thomas Dolby's]
"Headspace" will
connect technologists
and industry
professionals with
composers for
interactive mediums.

Dolby stressed the importance of creative artists and composers having access to the best tools possible for working in these new mediums; to this end he has formed a company called Headspace, which will serve to connect technologists and entertainment/software industry professionals with composers who will score for the interactive mediums.

The last workshop I attended was a lecture by Scott Fisher, formerly with the NASA-AMES research center, now the managing director of Telepresence Research in Portola Valley, California. The lecture was three hours of intensive discussion of the history of VR and telepresence research, and due to its magnitude, I won't attempt a point-by-point coverage of it here. Suffice it to say that Mr. Fisher is an interesting man with

lots of info, and if you ever get an opportunity to see him, don't miss it.

The Expo was over. I had my nifty rental car for the weekend. I took advantage of the situation and drove up the California coast to my dad's house in Ventura county, where I enjoyed a relaxing weekend sipping good beer by the poolside, poring through my notes on the conference and preparing to write this article. I'm looking forward to Meckler in May, and hope to meet many VRASPIans there. Until then, pleasant navigating! Δ



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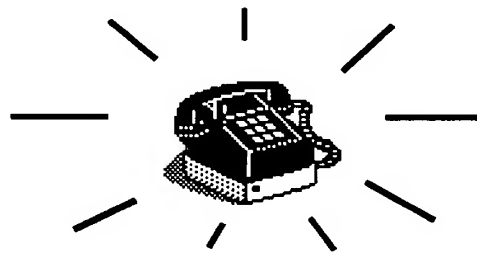
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The Virtual Reality Alliance of Students and Professionals

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April 27-29, 1993
IEEE Electro Conference
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VRASPizza Party following Glove Workshop April 27
Contact: (800) 877-2668

May 14-15, 1993
"The Third International Conference on Cyberspace"
Joe C. Thompson Conference Center, University of Texas at Austin
Contact: 3Cyberconf, School of Architecture
The University of Texas at Austin
Austin, TX 78712
(512) 471-1922 or email: 3cyberconf@bongo.cc.utexas.edu

May 25, 1993 7:30 PM
"VRASP Chat"
Bergen Tech High School, Hackensack NJ
Contact: George Gonzalez (201) 343-6000

Jun 17-18, 1993
"Virtual Reality and Persons with Disabilities,"
San Francisco Airport Marriott Hotel

Jun 23-26, 1993
"Industrial Virtual Reality 93"
Makuhari Messe Convention Center, Tokyo
Contact: Elizabeth A. Hitchcock
(203) 352-8423

Jul 7-9, 1993
"ICAT 93, the Third International Conference on Artificial Reality and Tele-Existence"
Nikkei Hall, Tokyo
Contact: Secretariat/ICAT 93, c/o JTTAS,
Plaza Mikado Bldg. 6F, 2-14-5 Akasaka Minatoku, Tokyo 107, Japan.
Phone: +81-3-3584-0207
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MONTAGE '93
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Oct 25-26, 1993
"IEEE Symposium on Research Frontiers in Virtual Reality"
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